Endangered Species Act - Section 7
Consultation

BIOLOGICAL OPINION
AND
CONFERENCE OPINION

Coos Bay - North Bend Water Board
Water Supply Expansion Project

Agency: Corps of Engineers, Portland District

Consultation Conducted By: National Marine Fisheries Service
Northwest Region

Date Issued: December 14, 1999

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I. BACKGROUND

In a letter dated January 20, 1999, the U.S. Army Corps of Engineers (COE), Portland District, requested Endangered Species Act (ESA) section 7 formal consultation with the National Marine Fisheries Service (NMFS) on the Coos Bay-North Bend Water Board Water Supply Expansion Project (CBNBWB project). The COE is evaluating the CBNBWB project under their regulatory authority found in Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. On February 17, 1999, NMFS responded with a letter to the COE requesting additional information. The COE subsequently revised the biological assessment (BA) and on July 2, 1999, completed the submission of supplemental information requested by NMFS. NMFS thereby initiated formal consultation and conference with the COE. Table 1 lists the anadromous salmonid Evolutionarily Significant Units (ESU)[1] and proposed critical habitat this biological and conference opinion (Opinion) addresses.

Table 1. Species and proposed critical habitat addressed in this biological and conference opinion.

Listed Species	**Scientific Name**
Oregon Coast coho salmon - Threatened	*Oncorhynchus kisutch*
Proposed Critical Habitat	
Oregon Coast coho salmon	
Candidate Species	**Scientific Name**
Oregon Coast coastal cutthroat	*O. clarki clarki*
Oregon Coast steelhead	*O. mykiss*

The objective of this Opinion is to determine whether the activities associated with the CBNBWB project are likely to jeopardize the continued existence of the candidate and listed species, or result in the destruction or adverse modification of proposed critical habitat. Should OC steelhead be listed under the ESA, or should critical habitat for Oregon Coast coho salmon be designated, the NMFS expects this conference opinion to serve as the basis for a biological opinion on implementation of the action, pursuant to 50 CFR § 402.10(d). The USDI Fish and Wildlife Service (FWS) will assume regulatory jurisdiction of OC cutthroat. Formal consultation and conference will be concluded with the issuance of this Opinion.

[1] For the purposes of conservation under the Endangered Species Act, an ESU is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species.

II. PROPOSED ACTION[2]

The action proposes to expand the water supply for the Coos Bay-North Bend Water Board (CBNBWB) in Coos County, Oregon. CBNBWB's facilities serve as the water supply for the cities of Coos Bay and North Bend, as well as several smaller communities located in the immediate area. The purpose of the expansion project is to provide a water supply capable of meeting immediate and estimated future "peak season" municipal and industrial demands through the year 2030. The current (1996) peak season demands of 7.6 million gallons per day (mgd) are expected to reach 9.4 mgd by 2005, and incrementally increase to 13.4 mgd by 2030. The CBNBWB's current facilities can serve a peak season demand of approximately 9 mgd in a normal precipitation year.

The CBNBWB project includes the following activities: (1) enlarging and raising the existing Upper Pony Creek Dam; (2) rehabilitating Joe Ney Dike and replacing an existing pipeline to the Upper Pony Creek Reservoir; and (3) reactivating existing wells and adding four new wells to a sand dune wellfield located within the Oregon Dunes Natural Recreation Area (ODNRA). In addition, the CBNBWB project proposes removing portions of an existing dike in Catching Slough to provide wetland mitigation. The CBNBWB project also proposes mitigation developed through a Memorandum of Understanding (MOU) with the Oregon Department of Fish and Wildlife (ODFW and CBNBWB 1999). The MOU's objective is to provide a "net benefit to wild anadromous and migratory native fish," and thereby meet the requirements for waiving the State of Oregon 's fish passage requirements for new or modified dams. Accordingly, the ODFW and CBNBWB MOU is evaluated in this Opinion as interrelated and interdependent to the CBNBWB Project.

Construction is expected to occur over 2 years, with development of the new wells and the resultant pipeline being the first activities to be initiated. Because the reactivation and addition of wells in the sand dune wellfield (item 3 from above) has independent utility and does not justify or obligate implementation of any of the other activities proposed in the CBNBWB Project, NMFS completed consultation on these activities separately. Accordingly, on August 6, 1999, NMFS concurred that the proposed reactivation and addition of wells in the sand dune aquifer was "not likely to adversely affect" (NLAA) OC coho salmon or OC coho proposed critical habitat. The potential construction of a new water treatment plant to treat water from the wellfield in subsequent year was not consulted upon, however, because only preliminary planning had been completed. The potential for initiating consultation with NMFS on the water treatment plan will need to be re-evaluated when and if planning advances sufficiently to evaluate the effects of the project on proposed and listed salmon. Therefore, the August 6, 1999 concurrence letter from NMFS concluded consultation for all activities currently proposed by the CBNBWB within the sand dune wellfield, and thus, the contribution of the expanded wellfield to the CBNBWB's future "peak season" municipal and industrial demands will be included in the

[2]Unless otherwise noted, these details are taken from the Final Environmental Impact Statement (FEIS) for the project (COE 1999b).

environmental baseline for in this Opinion.

A. Enlarging and Raising Upper Pony Creek Dam

This portion of the project entails construction of a new dam just downstream of the existing dam, which is located at approximately river mile (RM) 4.0[3] of Pony Creek. Raising the dam's effective height from 45 to 69 feet will triple the reservoir's water storage capacity from 2,150 acre-feet to 6,250 acre-feet and double the normal full pool area (from 130 to 273 acres). The footprint of the proposed earthfilled structure would extend approximately 400 feet downstream of the existing dam.

Construction of the raised Upper Pony Creek Dam would occur from May through October. Topsoil removed during dam construction would be stockpiled for subsequent restoration. A waste disposal area near the dam construction site has been identified. To prepare the foundation for the raised dam structure, unsuitable soil and rock would be excavated and replaced by suitable material from on-site borrow areas.

Much of the clearing needed for the dam construction and reservoir expansion has already been completed, although NMFS estimates that approximately 75 acres remain to be cleared for the dam site and the borrow, staging, and disposal areas. Vegetation stripped from the borrow areas will be stockpiled and spread over the disturbed sites following construction. Selective logging in accordance with the Oregon Forest Practices Act will be conducted within the forested areas immediately surrounding the new reservoir inundation zone. A riparian buffer that averages 100-feet wide and contains four "bulges" encompassing deciduous and conifer habitat is proposed around the reservoir.

Although limitations in mapping and surveying make it difficult to predict the exact innundation zone of the enlarged Upper Pony Creek Reservoir, approximately 2250 feet of road would be need to be relocated and approximately 200 feet of road would be raised (CH2M HILL 1999d; Nilson 1999).

Material for the new embankment will come primarily from on-site borrow sources. Approximately 41,000 cubic yards (CY) of the 317,000 CY required for the dam construction would be imported, and it is anticipated that the offsite supply would be met with existing quarry or sand and gravel operations from the local area (Mr. John Holroyd, PE, URS Greiner Woodward Clyde, September 7, 1999). The imported material would include filter sand, drain-rock, and rip-rap.

The CBNBWB proposes a minimum inflow release of 1 cubic feet per second (cfs) to lower Pony Creek at Merritt Dam for the life of the project (COE 1999a). In addition, the ODFW and

[3] The FEIS contained conflicting river mileages and stream distances. Therefore, for sites within the Pony Creek watershed, this Opinion will use approximate distances relative to U.S. Geological Survey (USGS) gage 14324580, which is located at RM 2.3 (Hubberd et al. 1998).

CBNBWB MOU provides for additional releases in order to meet the ODFW flow regime of 4 cfs in January and February; 3 cfs in December, March and April; and 2 cfs in November and May. Without additional water supplies, the ODFW flow regime is expected to impact the CBNBWB's water demands in approximately 2018 (COE 1999a). Consequently, ODFW has agreed to obtain storage water rights and as water availability allows, up to 835 acre feet of water would be pumped from the Joe Ney system to the Pony Creek watershed to provide the ODFW flow regime (ODFW and CBNBWB 1999). If any of the 835 acre feet of water remains available after May, it would be utilized for summer streamflow at the discretion of ODFW. In years when water availability from the Joe Ney system is reduced below that necessary to meet the ODFW flow regime, ODFW and CBNBWB would seek cooperative solutions towards resolving local water shortages. Although designs are not yet complete, the CBNBWB would release 1 cfs of the ODFW flow regime via a siphon/meter system, with any additional flow release occurring as spill from Merritt Dam.

Other key provisions of the MOU provide for the CBNBWB to accomplish the following: (1) Place 195 square yards of spawning gravel at identified sites in the lower Pony Creek watershed; (2) coordinate with ODFW to place instream structures such as logs at the gravel placement sites; (3) remove 180 feet of culvert from the Hospital Fork tributary and creating a 6 to 8-foot wide channel; (4) acquire 1.74 acres of wetland property to be protected by wetlands easement conditions; (5) complete a maintenance and monitoring plan developed by ODFW for the life of the project; and (6) submit the monitoring results in an annual report to ODFW (ODFW and CBNBWB 1999).

B. Joe Ney Dike Rehabilitation and Pipeline Replacement

Joe Ney Dike is a 9-foot earthen dam located at approximately RM 1.6 of Joe Ney Creek. Rehabilitation is proposed to consist of removing vegetation, excavating, reshaping, and armoring of the existing dike. Although the height of the dike will not be altered, the excavation and filling would result in the loss of 0.2 acres of lacustrine deepwater, 0.1 acre of estuarine wetland, and 0.1 acre of estuarine subtidal open water. The storage capacity behind the rehabilitated dike would remain at approximately 120 acre-feet of water.

The existing hydraulic structures at the dike, including a spillway, fish ladder, and outlet, would be replaced. The rehabilitated and replaced facilities would enable the dike to pass a 100-year flood.

The existing pump station at Joe Ney Reservoir, which has a pumping capacity of 1.5 cubic feet per second (cfs), is to be replaced by a new pump station capable of pumping up to 11 cfs of water (ODFW and CBNBWB 1999). In addition, the existing 10-inch diameter, above-grade pipeline that delivers water to the ridge line separating the Joe Ney and Pony Creek drainages, would be replaced by a buried, 22 to 28-inch diameter pipeline extending 8,800 feet to Upper Pony Creek Reservoir. The new pipeline would be realigned to avoid a wetland near Joe Ney Dike and the segment extending from the ridge line down to Upper Pony Reservoir would follow an abandoned road for most of its length. A total of about 1.1 acres of wetland will be temporarily disturbed during the excavation and installation of the new pipeline.

The ODFW and CBNBWB MOU provides a minimum of 5 cfs or natural flow, whichever is less, through the Joe Ney Dike fishway during the months of October through January and April through June. Although the CBNBWB Project originally proposed pumping 8 cfs from Joe Ney Reservoir to Upper Pony Reservoir (COE 1999a), the ODFW and CBNBWB MOU would provide for pumping up to 11 cfs of Joe Ney system water to Upper Pony Reservoir assuming that sufficient water rights can be secured by ODFW. Furthermore, the COE proposes that Joe Ney Reservoir operations would release water to manage for freshet events (peak flow events) at appropriate times for juvenile and adult migration (COE 1999a).

In addition, the CBNBWB pledges to continue coordination efforts with the other primary landowner in the watershed (Menasha Corporation, Land and Timber Division) towards good stewardship in the watershed, as well as to provide assistance to individuals or groups desiring to conduct habitat enhancement activities within the reservoir area (COE 1999a; COE 1999b).

C. Catching Slough Dike Removal

As part of the mitigation for loss of wetlands associated with developing the proposed Upper Pony Creek Reservoir, a 20-acre tidal wetland will be re-established by breaching a 2,000-feet long dike located at approximately RM 4 of Catching Slough.

D. Actions Common to the Proposed Activities

Excavation and ground disturbance will occur at each of the project sites. Construction practices would minimize ground disturbance and activities on steep slopes. Best Management Practices (BMPs) would be followed and the selected contractor will be required to obtain a storm water permit from the State of Oregon, Department of Environmental Quality (ODEQ). Where possible, road construction will avoid steep ground, stream crossings, or cuts and fills. Where such activities cannot be avoided, BMPs emphasize minimizing the amount of ground disturbance and crossings of streams or wet areas.

CBNBWB has submitted an application to the COE for a permit under Section 404 of the Clean Water Act and a Section 401 water quality evaluation will be prepared by ODEQ prior to project implementation. In addition, the proposed project is being reviewed by the Oregon Department of Land Conservation and Development for consistency with the Oregon Coastal Management Program.

III. BIOLOGICAL INFORMATION AND CRITICAL HABITAT

References and Federal Register notices providing biological information for the species and proposed critical habitat covered by this Opinion are given in Table 2 below. Additional information, including species distribution maps, scientific reports, and Federal Register notices, is available at NMFS' Internet site.[4]

The proposed action would occur within proposed critical habitat for OC coho salmon. Critical habitat is proposed to consist of all estuarine and freshwater habitat below longstanding naturally impassible barriers and selected dams (e.g., Merritt dam on Pony Creek) that block access to former coho salmon habitat. In designating critical habitat, NMFS considers the following requirements of the species: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing offspring; and generally, (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distribution of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on the known physical and biological features (primary constituent elements) within the designated area that are essential to the conservation of the species and that may require special management considerations or protection. NMFS, therefore, finds that essential features of coho salmon critical habitat include adequate (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage (May 10, 1999; 64 FR 24998).

Table 2. References for additional background on listing status, biological information, and proposed critical habitat elements for the listed and candidate anadromous salmonids in the action area.

Species	**Listing Status**		**Critical habitat (Proposed Rule)**	**Biological Information, Historical Population Trends**
	Proposed Rule	**Final Rule**		
Oregon Coast coho salmon	July 25, 1995 60 FR 38011	August 10, 1998 63 FR 42587	May 10, 1999 64 FR 24998	Weitkamp et al. 1995; Sandercock 1991
Oregon Coast steelhead	August 9, 1996 61 FR 41541	March 19, 1998 63 FR 13347	N/A	Busby et al. 1996
Oregon Coast Coastal cutthroat trout	April 5, 1999 64 FR 16397	N/A	N/A	Johnson et al. 1999; Hall et al. 1997

IV. EVALUATING PROPOSED ACTIONS

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA, and implementing regulations at 50 CFR Part 402. As summarized below, Attachment 1 (*The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions*

[4] (http://www.nwr.noaa.gov/1salmon/salmesa/index.htm)

Affecting the Habitat of Pacific Anadromous Salmonids) describes how NMFS applies the ESA jeopardy standards to consultations on Federal actions.

NMFS uses the following steps in conducting analyses of habitat-altering actions under section 7 of the ESA: (1) Consider the status and biological requirements of the affected species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. If jeopardy or adverse modification is found, NMFS must identify reasonable and prudent alternatives to the action if they exist.

A. Biological Requirements

The listed species' biological requirements may be described in a number of different ways. For example, they can be expressed in terms of population viability using such variables as a ratio of recruits to spawners, a survival rate for a given life stage (or set of life stages), a positive population trend, or a threshold population size. Biological requirements may also be described as the habitat conditions necessary to ensure the species' continued existence (*i.e.*, functional habitats) and these can be expressed in terms of physical, chemical, and biological parameters.

However species' biological requirements are expressed—whether in terms of population variables or habitat components—it is important to note that there is a strong causal link between the two: actions that affect habitat have the potential to affect population abundance, productivity, and diversity; these effects are particularly noticeable when populations are at low levels—as they are now in every listed ESU. The importance of this relationship is highlighted by the fact that freshwater habitat degradation is identified as a factor of decline in every salmon listing on the West Coast.

For this consultation, NMFS finds that the biological requirements of OC coho, OC cutthroat, and OC steelhead are best defined in terms of a concept called properly functioning condition (PFC). Properly functioning condition is the sustained presence of natural[5] habitat-forming processes in a watershed (*e.g.*, riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements.

In the PFC framework, baseline environmental conditions are described as "properly

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[5] The word *natural* in this definition is not intended to imply *pristine*, nor does the best available science lead us to believe that only pristine wilderness will support salmon. The best available science does lead us to believe that the level of habitat function necessary for the long-term survival of salmon (PFC) is most reliably and efficiently recovered and maintained by simply eliminating anthropogenic impairments, and does not usually require artificial restoration.

functioning," "at risk," or "not properly functioning." Actions that would be likely to impair properly functioning habitat, appreciably reduce, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC at the population or ESU scale will usually be found likely to jeopardize the continued existence of the species or adversely modify its critical habitat or both.

Attachment 1 and NMFS (1996) provide additional information on using this approach and the *Matrix of Pathways and Indicators* (MPI; often called "The Matrix,") for making effects determinations based on the condition of the environmental baseline and the likely effects of a given project. The MPI helps NMFS describe current freshwater habitat conditions, determine the factors limiting salmon production, and identify sensitive areas and any risks to PFC. The MPI only helps make effects determination, it does not describe jeopardy criteria per se.

The MPI provides a consistent, but geographically adaptable, framework for effects determinations. Although the MPI was developed for forestry activities, NMFS finds it useful for other land management activities, including the proposed CBNBWB project. For example, NMFS found the addition of salinity and dissolved oxygen to the habitat indicators of the Water Quality pathway was well suited for assessing estuarine and reservoir habitats affected by the proposed project.

B. Environmental Baseline

The environmental baseline, to which the effects of the proposed action are added, "includes the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (50 CFR § 402.02).

The reason for determining the species' status under the environmental baseline (without the effects of the proposed or continuing action) is to better understand the relative significance of the effects of the action upon the species' likelihood of survival and chances for recovery. Thus, if the species' status is poor and the baseline is degraded at the time of consultation, it is more likely that any additional adverse effects caused by the proposed or continuing action will be significant.

Accordingly, the environmental baseline of the subject ESUs is described below.

1. Current Range-wide Status of OC Coho, OC Cutthroat, and OC Steelhead

OC Coho Salmon

NMFS described the current status of the OC coho ESU in Weitcamp et al. (1995), and in the proposed and final rules (July 25, 1995, 60 FR 38011; May 6, 1997, 62 FR 24588; August 10, 1998, 63 FR 42587). Spawner survey information is currently the best information to characterize OC coho population trends. Spawning escapements have declined substantially during this century and may now be less than 5% of their abundance in the early 1900s. Although spawner abundance has been relatively constant since the late 1970s, preharvest abundance as declined and average recruits per spawner may also be declining. Widespread habitat degradation was noted throughout the Oregon coast region by the Biological Review Team (BRT).

OC Cutthroat Trout

NMFS's status review for coastal cutthroat (Johnson et al. 1999), and the proposed rule (April 5, 1999, 64 FR 16397) describe the status of OC cutthroat. The NMFS status review indicates that OC cutthroat occur mostly in small populations that are relatively well distributed. Although only limited data exists, most abundance information available for OC cutthroat populations suggest that juvenile production is steady to increasing, while there may be short- and/or long-term declines in anadromous adult abundance (Johnson et al. 1999). The BRT was concerned about reductions in anadromous life-history forms in the ESU, as well as continuing habitat degradation. Recent reductions in hatchery-origin coastal cutthroat and coho salmon fry releases were noted as positive factors.

OC Steelhead

The status of OC steelhead is described in the final rule (March 19, 1998, 63 FR 13347) and Busby et al. (1996). Most steelhead runs within this ESU had been declining, although this may be affected by recent climatic conditions. The BRT had strong concerns about the opportunity for genetic introgression from hatchery stocks and potential ecological interactions between introduced stocks and native stocks. Limited data suggests that the total winter steelhead run in the Coos River basin, which is 65% to 70% hatchery fish, is on a downward trend of -0.5 % to -2.5 % per year (Busby et al. 1996).

<u>2. Action Area.</u>

The "action area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). The action area for the CBNBWB project, therefore shall be defined as consisting of a 119,000 acre portion of the Coos River basin referred to as the "Coos Bay sub-basin" by the Coos Watershed Association (CWA 1995). The Coos Bay sub-basin contains nearly 30 small watersheds tributary to the Coos Bay estuary, the sloughs (estuarine subsystems) of the Coos Bay estuary, and a tidally-influenced portion of the Coos River. Areas within the Coos Bay sub-basin directly affected by the proposed actions, and of most relevance to this Opinion, include: (1) Joe Ney watershed (Joe Ney Creek and Joe Ney Slough); (2) Pony Creek watershed (Pony Creek and Pony Slough); and (3) a 20 acre site within Catching Slough. The Joe Ney watershed drains 5.1 square miles (3264 acres), while the Pony Creek watershed drains approximately 6.4 square miles (4096 acres) (COE

1999a).

Little specific information is available on the current status of anadromous salmonids in the action area, particularly from the watersheds where most of the activities associated with the proposed project will occur. The limited information available on the distribution and status of OC coho, OC cutthroat, and OC steelhead within the action area is summarized below, followed by a description of the environmental baseline conditions.

3. Current Status of OC Coho, OC Cutthroat , and OC Steelhead Within the Action Area.

OC Coho

Stratified random sampling from the Coos basin suggest a substantial upward trend in coho spawning abundance from 1990-1994, before tapering off in 1995 and 1996, and a marked decline in 1997 (Jacobs and Nickelson 1998). Preliminary peak counts from the 1998-99 spawning season suggest a slight improvement over 1997.[6]

Palouse and Larson creeks, which are tributary to Haynes Inlet on the north side of the Coos Bay estuary, are among the most productive streams for coho in the Coos Basin (Wagoner et al. 1990). Larson Creek has been designated as a State of Oregon "Core Area[7]," although Palouse and Larson creeks are both considered to function as coho refuges locally during periods of low abundance (Reimers et al. 1995). Sampling by personnel from the South Slough National Estuarine Research Reserve (SSNERR) and ODFW suggest that Winchester Creek, the largest tributary to the South Slough of Coos Bay, may also be an important producer of coho (Sadro 1999).

Hatchery releases of juvenile coho began in the Coos basin in the early 1900s. Over 60 million coho juveniles were released between 1908 and 1950, and approximately 40 million coho juveniles were released in the Coos basin between 1976 and 1989 (Wagoner et al. 1990). Since 1990, the number of coho juveniles released has declined, and these have generally been limited to fry releases in under seeded habitat and coho smolts releases in Isthmus Slough (Reimers et al. 1995). These releases of hatchbox fry, presmolts, and/or smolts were intended to target selected lower river areas where natural production was "low or non-existent" (Wagoner et al. 1990). Approximately 220,000 coho fry have been released in Pony Creek from 1991 to 1996 (ODFW 1999a). Efforts to minimize impacts of hatchery fish on wild coho have apparently been successful in Palouse Creek, where the escapement of hatchery fish was successfully reduced from 1991 to 1994 (Reimers et al. 1995).

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[6] (http:/osu.orst.edu/Dept/ODFW/other/spawn/data/inpkmile_1.html).

[7] (http:/www.oregon-plan.org/FCH15.html). Core Areas are individual reaches or watersheds within individual coastal basins judged to be of critical importance to the persistence of salmon populations that inhabit those basins.

The FEIS indicates that relatively small numbers of coho salmon have been reported to utilize the Joe Ney watershed since 1959 (COE 1999b). The most recent sampling was conducted in Joe Ney Reservoir on April 21, 1998, when 5 juvenile coho were captured by ODFW. Although the BA suggests that 2 of the juveniles may have been naturally spawned because they were not fin clipped (COE 1999a), recent information from ODFW indicates that all 5 were marked hatchery fish that immigrated into the reservoir (Muck 1999).

Only anecdotal information exists regarding coho use of the Pony Creek watershed. Although Pony Creek may have once supported a healthy run of coho salmon, the construction of Merritt Dam (also known as Lower Pony Dam) in the 1920s blocked upstream passage to what was likely the most productive spawning habitat for anadromous fish in the system (Paul Reimers, ODFW District Biologist, 2/11/99). Although Pony Creek does not apparently support a self-reproducing run of coho currently, the lower reaches remain accessible to coho and remain potential rearing habitat (CWA 1995). The only recent observations of adult coho in lower Pony Creek (downstream of Merritt Dam) are unverified, and have reportedly occurred in the Hospital Fork tributary where hatchbox raised coho fry were released (Tom Rumreich, ODFW Assistant District Biologist, 4/19/99). Although Pony Creek no longer supports a viable population of coho salmon (ODFW 1998), ODFW believes that the re-establishing a small run of naturally spawning coho in lower Pony Creek remains possible (Paul Reimers, ODFW, 2/11/99). The only documented fish sampling to occur in lower Pony Creek took place in 1997 and 1999; electrofishing in Pony Creek and two tributaries (K-Mart Fork and Hospital Fork) yielded only cutthroat trout (ODFW 1999b).

OC Cutthroat

Resident and anadromous cutthroat are apparently well-distributed in the action area (Wagoner et al. 1990). Although local hatchery releases began in the 1950s, ODFW has relied upon natural production of cutthroat in the Coos Basin since 1985. Although inconclusive in regards to the life-histories represented, recent sampling by ODFW found multiple year classes of cutthroat well distributed in the Joe Ney and Pony Creek watersheds (COE 1999a; COE 1999b; ODFW 1999d). Winchester Creek, the largest tributary to the South Slough of Coos Bay, also supports a relatively healthy and naturally reproducing population of saltwater migratory OC cutthroat (Frank et al. 1988; Sadro 1999).

OC Steelhead

Little information about the status of steelhead in the action area has been documented. Palouse and Larson Creeks reportedly support steelhead runs that have been augmented with hatchery releases (Wagoner et al. 1990). More recent surveys have found hatchery fish to comprise over 90% of the creel census, and between 41 to 59% of the spawning ground escapement in the Coos basin (Reimers et al. 1995). Although Pony and Joe Ney creeks may have historically supported small steelhead runs, steelhead have not been reported in either watershed since the 1970s (COE

1999b). Sampling by the South Slough National Estuarine Research Reserve (SSNERR) and ODFW found that steelhead trout made up about 5% of the smolts from Winchester Creek, a stream near Joe Ney Slough (Sadro 1999).

4. Current Status of Habitat Environmental Baseline Within the Action Area.

Pony Creek

Pony Creek is a third-order stream with a drainage area of 6.4 square miles (COE 1999a). Reservoirs are located behind Upper Pony Dam and Merritt Dam, located at approximately RM 4.0 and 2.5, respectively. Approximately 3.9 square miles of watershed are located above Merritt Dam. The only significant land use above Merritt Dam other than the CBNBWB's facilities has been commercial forestry. Much of lower Pony Creek watershed (downstream of Merritt Dam) is urbanized and within the city limits of North Bend and Coos Bay (COE 1999a)

Although the best salmonid spawning habitat historically available in the Pony Creek system is likely inundated by the Upper Pony and Merritt reservoirs, the impoundments and their tributary streams currently provide ample rearing habitat and sufficient spawning area to support viable populations of OC cutthroat (COE 1999a; COE 1999b).

Timber harvest activities have likely increased the sediment load into Upper Pony Reservoir. Although no water quality data from Upper Pony Reservoir exists, high levels of algae occur occasionally, although anoxic conditions rarely, if ever, occur (COE 1999b). Algae and other natural organics apparently cause the high levels of total trihalomethanes that have been a seasonal problem in the water from the reservoir (CH2M HILL 1996a:14).

Upper Pony Reservoir has a mean depth of 16.5 feet and a maximum depth of 39 feet. Ten years of data indicates that even in dry years the reservoir typically fluctuates around full pool from January to June before being drawn down approximately 16 - 18 feet by October or November, although it has been drawn to stream level twice since 1976 (COE 1999b).

Merritt Reservoir is typically held near full pool all year, and is 16 feet deep at the face of the dam (Hoffine 1999). Based upon information from other lakes in the vicinity, Merritt Reservoir may be of sufficient depth to create a thermocline and/or depressed dissolved oxygen levels near the bottom of the lake during the summer. Eel and North Tenmile lakes, for example, begin to stratify at approximately 16 and 13 feet, respectively (Johnson et al. 1985:191, 243). In addition, the CBNBWB water treatment plant utilizes the higher of two intakes at Merritt Dam, in part, because of concerns about manganese levels (reflective of anoxic conditions) (Ron Hoffine, CBNBWB Operations Director, 9/15/99).

Pony Creek is designated as water quality limited for fecal coliform bacteria by DEQ (COE 1999b), and based upon water temperature information collected at the CBNBWB water treatment plant, portions of the watershed may be limited for water temperature also. In August

1998, for example, unofficial data from CBNBWB indicates that the 7-day moving average of the daily maximum water temperature from Merritt Reservoir was over 23°C, and average temperatures from June through September range from 17.8 - 22.4°C (CBNBWB 1999a; CBNBWB 1999b).

The lower 2.5 miles of Pony Creek and portions of three small tributaries (AAA Fork, Hospital Fork, and K-Mart Fork) remain accessible to anadromous salmonids. Only qualitative habitat surveys of lower Pony Creek and its tributaries have been completed, but the streams can be characterized as providing low to moderate quality rearing habitat for salmonids (COE 1999a).

The CBNBWB reservoirs have reduced the estimated unregulated Pony Creek peak flows by about 40%, and thereby may have contributed to encroachment of vegetation upon the lower Pony Creek channel, increased channel roughness and decreased channel conveyance of flood events (CH2M HILL 1999a; COE 1999b). Spill of excess water occurs so infrequently that the 50% exceedence[8] flow released below Merritt Dam exceeds 5 cfs only during February and March (COE 1999a). However, urban development in the lower Pony Creek watershed has likely reduced, if not overwhelmed, the effect of the reservoirs on reducing peak flows (Spence et al. 1996:131, 146), and flooding remains a seasonal inconvenience to commercial developments located in lower Pony Creek's floodprone areas.

The tide gates located on Pony Creek about 0.25 mile above the Pony Slough mud flats are not fully functional. Consequently, tidal influence extends upstream a short distance beyond the tide gates, and it is unlikely that fish passage is severely impeded currently (COE 1999a). Inspection of the tide gates by NMFS suggests the upstream entrance to the tide gates may be susceptible to debris blockages, which would contribute to the seasonal flooding experienced upstream. Beaver dams are routinely pulled out of lower Pony Creek in an attempt to reduce flooding and/or facilitate upstream passage of adult hatchery fall chinook which are acclimated as fry in lower Pony Creek prior to their release (T. Rumreich, ODFW, 4/19/99).

Approximately 20 years of U.S. Geological Survey (USGS) gage data located just downstream of Merritt Dam at RM 2.3 indicates estimated exceedence flows for the period of record are as follows: (1) 5% exceedence flow of 24 cfs, (2) 50% exceedence flow of 0.1 cfs, (3) 80% exceedence flow of 0.02 cfs, (4) and the flow of record is 163 cfs (COE 1999b). Base (i.e., 50% and 80% exceedence) flows in lower Pony Creek have been significantly reduced from what would occur in the unregulated condition for all months except August through October (CH2M HILL 1999a; also see Table 3).

Summer streamflows and spawning gravel are the most critical constraints for salmonids in the lower Pony Creek watershed (ODFW and CBNBWB 1999), but salmonid production is also adversely affected by urban encroachment and low to moderate qualitiy rearing habitat (COE 1999a). Although no measurements are available to quantify the baseline condition, the COE

[8] The probability a given flow will be exceeded (or not exceeded).

also notes an increase in impermeable surface, as well as riparian and water quality concerns in lower Pony Creek (COE 1999a). Cursory reconnaissance by NMFS suggests that many of the effects of urbanization identified by Spence et al. (1996:130-134) have adversely affected lower Pony Creek (e.g., loss of riparian vegetation, soil disturbance, reduced infiltration, increased water temperatures, loss of stream structure, and altered aquatic insect communities). Despite past and ongoing impacts to lower Pony Creek and the three primary tributaries (AAA Fork, Hospital Fork, and K-Mart Fork), remnant reaches of relatively intact habitat exist in the lower watershed. Lower Pony Creek, K-Mart Fork, and the Hospital Fork each contain short reaches where existing riparian vegetation provides adequate shading and the potential for wood recruitment. In addition, lower Pony Creek contains two functional wetland/marsh areas that remain undeveloped.

Existing information is not available to designate refugia for listed and candidate salmonids in the watershed. Because of the general poor quality of habitat in lower Pony Creek (COE 1999a), the most intact reaches of freshwater habitat remaining in lower Pony Creek may be considered as refugia for anadromous salmonids until more information becomes available. In addition, the two largest tributaries to Upper Pony Reservoir, Libby Arm South Fork and Tarheel Arm, may likely be refugia for freshwater migratory cutthroat in the upper watershed. The contribution, if any, of Upper Pony Reservoir cutthroat to the lower Pony Creek cutthroat population is not known, but NMFS assumes that cutthroat are currently capable of emigrating downstream occasionally over the dam's spillway or through the outlet near the bottom of the dam.

Joe Ney Creek

Joe Ney Creek, a second-order stream, is the largest tributary to Joe Ney reservoir and Joe Ney Slough. Joe Ney Reservoir is a freshwater impoundment created by Joe Ney Dike, which is located approximately 1.6 miles upstream from the confluence of Joe Ney Slough and South Slough. Joe Ney Reservoir impounds runoff from a 3.8 square-mile drainage area containing several tributary streams, and is used as a municipal water supply by the CBNBWB (COE 1999b). A dike has been present at the site since about 1914, when the upper tidal mudflat and salt marsh of Joe Ney Slough was converted to agricultural uses (Taylor and Frankel 1979).

Joe Ney Dike is currently is 9-feet high and the reservoir, with a mean depth of 3.2 feet and a maximum depth of 7 feet, is about 37 acres at full pool. From May through November, an average flow of 1.5 cfs is pumped from Joe Ney Reservoir to the Pony Creek drainage.

During the summer, Joe Ney Reservoir is drawn down to a pool area of about 10 acres and a maximum depth of about 3.4 feet. This drawdown likely adversely affects water quality (e.g., temperature, dissolved oxygen), although there have been no measurements to quantify the environmental baseline (COE 1999a; COE 1999b). Based upon measurements from nearby Merritt Reservoir however, Joe Ney reservoir water temperatures during the summer likely exceed levels stressful to salmonids (CBNBWB 1999a; CBNBWB 1999b).

Sedimentation from three to four rotations of timber harvest in the Joe Ney subwatershed has been implicated as contributing to excessive sediment in the affected streams and Joe Ney Reservoir (ODFW 1994; COE 1999b). An estimated 40-60 inches of accumulated sediment has decreased the mean depth and likely contributed to macrophytic growth in Joe Ney Reservoir (CH2M HILL 1996a:6).

A review of flow data provided in the BA (COE 1999a) and by CH2M HILL (1999c) indicates that current operations retain many characteristics of the unregulated flow regime because pumping operations (1) do not begin withdrawing water from Joe Ney Reservoir until the spring, and (2) pumping ceases when the reservoir is drawn down to its minimum pool. With the exception of reaching base summer flow approximately a month early in normal and dry years, the timing, magnitude, duration, and spatial distribution of peak, high, and low flows mimic a dampened, but unregulated, condition.

Although streamflows in Joe Ney have not been measured, flows have been estimated using 7 years of Oregon Water Resources Department (OWRD) gage data from a similar, nearby basin (COE 1999b). Thus, the estimated exceedence flows for the drainage catchment above Joe Ney Dike using the transferred flow data are (1) 5% exceedence flow of 37 cfs, (2) 50% exceedence flow of 4.3 cfs, (3) 80% exceedence flow of 0.6 cfs, and (4) a peak flow of record equaling 304 cfs.

Joe Ney Creek and its tributaries were surveyed by ODFW in 1993 (ODFW 1994). The survey results indicate that ample, high quality rearing habitat is provided by low gradient, wetland habitat located in the lower stream reaches just upstream from Joe Ney Reservoir. The 1993 inventories found very little instream wood or spawning gravel, and the riparian vegetation lacked large conifers. Modeling by ODFW (1994) suggest that spawning gravel is limiting for coho salmon. Other habitat surveys conducted in the watershed suggest that the available spawning gravels are limited to small patches in the headwaters of the small tributaries (Stone 1987:82-85; COE 1999b).

Coos Bay Estuary and Other Tributaries

Little specific information is available on other tributaries to the Coos Bay estuary. Although the upland areas of the Coos River basin are sparsely populated and managed primarily by five landowners, the lowland and estuarine areas tend to be more densely populated and under the management of numerous, small landowners (CWA 1995). The cities of North Bend and Coos Bay are also located along the Coos Bay estuary. Although the climate is characterized as moist, maritime, and temperate, 80% of the annual precipitation typically falls between November and April (COE 1999b).

Much of the action area was either converted to agriculture, burned over, or logged by 1900 (Arnsberg et al. 1997). A review of historical records and accounts suggests that many of the small tributaries to Coos Bay have had the estuarine portions of their drainages transformed from meandering or multi-channeled salt marshes to single-channel, freshwater streams through a combination of draining and filling of wetlands, diking, and tidegates (Arnsberg et al. 1997).

Although practices have improved, the removal of riparian vegetation and increased sedimentation from surface erosion and landslides from past logging have impacted stream habitat. A lack of suitable spawning gravel is likely to be a primary limiting factor for salmonids in some streams, although winter habitat is typically limiting for coho, steelhead, and cutthroat trout (Wagoner et al. 1990). The Coos Watershed Association's strategy for protecting and increasing anadromous fish in the basin addresses the following habitat indicators important to coho: (1) Water temperature; (2) turbidity; (3) chemical contamination/nutrients; (4) physical barriers, (5) substrate; (6) large woody debris; (7) off-channel habitat; (8) floodplain connectivity; (9) disturbance history; and (10) riparian vegetation (CWA 1995). Similarly, an ODFW coho salmon restoration plan area suggests the following habitat indicators need improvement in the action area: (1) Off-channel habitat; (2) large woody debris; (3) riparian vegetation; (4) substrate; (5) turbidity; and (6) physical barriers (Reimers et al. 1995).

Although Coos Bay is the largest estuary entirely within Oregon, only about 10% of the salt marshes present at the turn of the century remained functional in 1974 (Hoffnagle and Olson 1974). Catching Slough, Kentuck Slough, Pony Creek Slough, and Joe Ney Slough are among the most impacted sloughs in the estuary. Due to dredging and diking, Hoffnagle and Olson (1974) estimated only about 3% (50 acres) of the 1600 acres of functional slough present in Catching Slough at the turn of the century remained, and that about 944 acres of Catching Slough's functional salt marsh had been reduced to about 145 acres.

A summary of available information by Roye (1979) indicates that: (1) The channel through the Coos Bay estuary was historically 10-11 feet deep and about 200 feet wide with numerous shoals; (2) the water column in most of the Coos Bay estuary is well mixed, except during the winter months when the bay may become stratified or partly mixed, depending upon the discharge from the Coos River and the tide; (3) low freshwater inflows and poor circulation seasonally contribute to poor water quality (e.g., high water temperature, poor circulation, turbidity, coliform and/or low dissolved oxygen) in several sloughs of Coos Bay; (4) assorted contaminants exceed U.S. Environmental Protection Agency (EPA) standards at several locations; (5) a 1974 study found that Coos Bay's marshes were the most severely altered of the 14 estuaries examined; (6) Pony Slough remains highly productive even though the slough has been impacted by filling that began as early as 1917; and (7) developments or pollution in the Charleston area are of concern due to their ability to influence on water quality in the South Slough National Estuarine Research Reserve.

Coos Bay also supports striped bass (*Morone saxatilis*), with Pony and Catching Sloughs being particularly important to this non-native piscivore (Roye 1979). Although predation has been documented, studies are inconclusive regarding its effects on the abundance of coho (Wagoner et al. 1990). Recent assessments indicate that the striped bass population is depressed despite annual stocking, and that inbreeding has contributed to a high percentage of hermaphrodites

(Reimers et al. 1995).

Additional information indicates that nine years of mussel (*Mytilus edulis* and *M. californianus)* sampling near the mouth of Coos Bay (Coos Head) found contamination levels for the following chemicals are decreasing: (1) Copper, (2) dieldrin, and (3) butyl tin. Of 186 coastline locations sampled for at least six years, Coos Head is the only site where DDT levels are increasing. In addition, mussel sampling directly across the bay from Pony Slough indicates Russell Point contamination levels for zinc are within the top 15% of 274 sites sampled (NOAA 1998).

In addition, 19 of the 27 water bodies within the Coos River basin listed as water quality limited by the Oregon Department of Environmental Quality (ODEQ), were from the Coos Bay estuary (ODEQ 1998b). All 19 sites from the estuary are listed for bacteria. Although three sites within the estuary were listed by ODEQ as water quality limited for toxics (tissue tributyltin) in 1996 (ODEQ 1998a), these sites were not listed in 1998.

Summary

Based on the best information available regarding the current status, population trends, and genetics of the listed and candidate species rangewide and within the action area, and the poor environmental baseline conditions within the action area, the NMFS concludes that not all of the biological requirements of the listed and candidate species within the action area are currently being met under the environmental baseline. Significant improvements in habitat conditions are needed to meet the biological requirements for survival and recovery of these species. Any further degradation of these conditions would have a significant impact due to the amount of risk the listed and candidate species presently face under the environmental baseline.

V. ANALYSIS OF EFFECTS

A. Effects of Proposed Action

<u>Raising Upper Pony Creek Dam</u>

Water Quality

Water Temperature. The effect of the proposed project upon the existing water temperature regime in Pony Creek is difficult to predict because little baseline information has been collected and water temperature was not identified as an issue during the environmental studies. Water quality in Merritt Reservoir is not anticipated to change (CH2M HILL 1996a:26). In addition, the proposed minimum flow release of 1 cfs during June through October is a significant improvement over the current condition and should tend to reduce the daily maximum water temperatures in lower Pony Creek during the summer (COE 1999a).

As described below however, NMFS finds the water to be spilled from Merritt Reservoir would often exceed temperatures recommended for listed and candidate salmonids. Although the water temperatures of spill from Merritt Dam have not been measured, samples have been taken twice daily from the intake to the CBNBWB water treatment plant. The water treatment plant intake is at a depth of 6 to 8 feet, and NMFS assumes measurements from the intake reflect the temperature of water spilled at Merritt Dam. The measurements indicate: (1) Average temperatures from December through February range from 8.1 - 12.4°C, (2) average temperatures from June through September range from 17.8 - 22.4°C, (3) average temperatures in the other five months display more annual and seasonal variation, ranging from 10.8 - 18.9°C, (4) 7-day moving average of the daily maximum water temperature can exceed 23°C; and (5) average diurnal fluctuation is relatively small, ranging from 0.4 - 0.7°C (CBNBWB 1999a; CBNBWB 1999b).

Temperatures of water spilled during the winter, therefore, will often exceed those recommended for OC coho and OC steelhead spawning (4.4 - 9.4°C; Bjornn and Reiser 1991), and are within ranges reported to adversely affect coho alevin and fry size (8 - 12°C; Beecham and Murray 1990), susceptibility of coho eggs to soft-shell disease (13°C; Cousins and Jensen 1994), and survival rates of coho eggs and alevins (11°C; Tang et al. 1987).

Although the FEIS and the CBNBWB have not yet proposed a design for the siphon from which the 1 cfs minimum flow release to lower Pony Creek would be released, NMFS assumes water from near the bottom of Merritt Reservoir would be used although water quality concerns (i.e., dissolved oxygen) may influence the best location for the intake. Based upon temperature gradients from other reservoirs in the area (Johnson et al. 1985:191, 243), NMFS anticipates that the water temperature at 16 feet would be at most 2-3°C cooler than at 6-8 feet. Therefore, during the summer, average temperatures from a bottom release of water would exceed: (1) The maximum preferred for rearing OC coho (14.6°C), OC cutthroat (12.9°C), and OC steelhead (14.6°C) from June until September (Beschta et al. 1987); (2) temperatures that salmonids generally avoid if possible (15°C; Brett 1952); as well as occasionally reach (3) temperatures typically stressful for salmonids (18.3°C; ISG 1996), and (4) the point at which growth of salmonids generally ceases (20.3°C; Bell 1986). If Merritt Reservoir does not create a thermocline during the summer, water temperatures released during the summer could at times, approach water temperatures potentially lethal to OC coho (26 - 28°C), OC cutthroat (22.8°C), and OC steelhead (23.9°C) (Bjornn and Reiser 1991).

In summary, NMFS concurs that the proposed project would tend to improve summer water temperatures in lower Pony Creek. However, NMFS also concludes the resultant water temperature regime: (1) Would not restore properly functioning habitat conditions, (2) may adversely affect reproduction, and (3) may contribute to sub-lethal effects, such as reduced growth, stress, disease, and impaired juvenile migration, to juvenile salmonids (Beschta et al. 1987; ODEQ 1995; Spence et al. 1996:103-104).

Turbidity. Ground disturbance resulting from the dam and reservoir construction, as well as extending the pipeline from Joe Ney Reservoir may increase sediment deliveries to Upper Pony and Merritt reservoirs. Although short-term increases in turbidity may result, implementation of the proposed erosion control measures (e.g., seeding, biofiltration bags, siltation fences, scheduling of erosion-producing activities at biologically non-critical times, maintenance of vegetated buffer zones, use of clean gravel for the upper 1 foot of fill over any excavation in streams) should minimize adverse effects to aquatic resources (COE 1999b).

With 2030 demands, the average water surface elevation in Upper Pony Reservoir during a dry year would fluctuate more than the current reservoir. For example, in a normal water year, the water surface would be approximately 10 feet below the spill elevation for about 7 months of the year (August to February), and the maximum amount of drawdown (about 17 feet) would be less than the current condition (about 40 feet). In a dry year, however, the average water surface elevation would be over 25 feet below spill level for each month of the year, and over 40 feet below spill level for six months of the year (CH2M HILL 1999b).

Initial findings suggested that if not managed properly, operation of the Upper Pony Reservoir could cause rapid-drawdown landslides along the margins of the reservoir (COE 1999b). However, a subsequent stability assessment has found that although the project will likely increase the potential for localized failures in the access road, the relatively low rate of water level change anticipated in Upper Pony Reservoir creates a very low stability hazard for significant slides (URS 1999). Furthermore, even though the amount and duration of shoreline exposure in Upper Pony Reservoir under future conditions would be increased significantly, CH2M HILL (1996a:22) anticipates no increases in sedimentation from shoreline erosion.

In summary, NMFS concludes that turbidity from construction of the CBNBWB project will temporarily impact listed and candidate salmonids in the Pony Creek watershed, but that adequate measures to minimize adverse effects and maintain the *Turbidity* indicator over the long-term are included in the project design. However, this finding is contingent upon: (1) The CBNBWB continuing to implement preventative road maintenance; (2) adequate monitoring; and (3) implementation of the permit requirements of other State and Federal agencies (i.e., ODEQ, COE, and Oregon Division of State Lands).

Other Water Quality Parameters. Oxygen depression and elevated nutrient concentrations in Upper Pony Reservoir's hypolimnion are expected to occur for 1 to 10 years after the new reservoir is filled (CH2M HILL 1996a:21-22). The greatest effect would be expected to occur in the first 2 or 3 years. No water quality measurements have been taken to determine the existing oxygen or nutrient levels, however a review by Bjornn and Reiser (1991) indicates swimming performance, food conversion, and growth rates of salmonids would be adversely affected by dissolved oxygen levels <5 mg/L. Although the CBNBWB project would address the short-term effects of oxygen depletion and nutrient enrichment by clearing and burning the area of proposed inundation, nutrient loading may still occur because of nutrient increases from logging and burning (Spence et al. 1996:113, 220). In addition, NMFS is concerned that water quality in Merritt Reservoir could be indirectly affected because the footprint of the new Upper Pony Dam would occupy a section of stream that currently may help to reaerate oxygen depleted water (FISRWG 1998).

Although major incidents are unlikely, accidental spills of fuels, oils, and other pollutants associated with construction activities could result in degradation of water quality and adversely affect salmonids. The COE would avoid accidental spills through prevention and contingency plans (COE 1999b).

The proposed project would reduce freshwater inflow to Pony Slough by 20-45% during the winter and spring, and thereby cause the salinity in Pony Slough to moderately increase so that it tends more closely towards the salinity in Coos Bay (CH2M HILL 1996a:26). In addition, reducing the release of water at Merritt Dam from late fall through the spring would affect the dilution of fecal coliform bacteria in Pony Creek. Although the COE believes that fecal coliform bacteria is not expected to be a current problem, the FEIS recommends regular maintenance of septic systems in the watershed, water quality testing, and if necessary, signing to report the hazards of coming into contact with contaminated water (COE 1999b).

In summary, the proposed project is likely to result in oxygen depression and elevated nutrient concentrations in the hypolimnion of Upper Pony Reservoir for at least 2 or 3 years post-construction. Although water quality in Merritt Reservoir is not anticipated to change (CH2M HILL 1996a:26), NMFS finds that there may be short-term impacts to water quality in Merritt Reservoir and the subsequent releases to lower Pony Creek. In addition, reduced flow releases to lower Pony Creek will likely result in permanent alterations in the salinity of Pony Slough, and may indirectly result in higher fecal coliform bacteria levels in lower Pony Creek. While the impact of these water quality changes upon salmonids is difficult to predict, NMFS anticipates that the resultant effects would be relatively minor and difficult to measure independently of other influences. However, because there is no baseline information available to evaluate NMFS's assumption, monitoring of relevant water quality parameters will be required.

Habitat Access

Physical Barriers. The ODFW and CBNBWB MOU would remove 180 feet of culvert near the mouth the Hospital Fork tributary and thereby improve access to the Hospital Fork tributary. NMFS notes however, that a large culvert (approximately 100-feet long) was recently placed about 0.5 mile upstream of the culvert to be removed.

The BA indicates that OC cutthroat passage between the Upper Pony Reservoir and several tributaries will be maintained through road culverts constructed per ODFW guidelines. In addition, pool and weir fish ladders constructed in coordination with ODFW will provide fish passage into the two Upper Pony wetland mitigation sites.

Although neither the significance of nor the degree to which lacustrine adfluvial cutthroat from Upper Pony Reservoir emigrate downstream to other areas of Pony Creek is known, the downstream emigration of cutthroat from Upper Pony Reservoir may be reduced because of less surface spill (COE 1999b). According to final designs, surface spill would occur only in emergency situations, i.e., flows exceeding a 100-year event (Holroyd 1999). The COE believes safe passage for the few cutthroat anticipated to pass through the outlet pipe at the bottom of the proposed reservoir can be easily engineered (COE 1999b). NMFS, however, finds the outlet works proposed for Upper Pony Dam are likely to injure or kill OC cutthroat. Fish entrained into the outlet works are likely to strike objects at high velocities as well as suffer from severe and immediate decompression. In addition, OC cutthroat would continue to be entrained into the unscreened water treatment plant intake at Merritt Dam.

In summary, NMFS finds that the *Physical Access* indicator for the watershed will be maintained despite the improvements proposed for the Hospital Fork because: (1) One-way migration of cutthroat downstream of Upper Pony Reservoir is likely to be reduced; and (2) anadromous salmonids in Pony Creek will continue to have their access to the best remaining salmonid spawning and rearing habitat in the watershed blocked by physical barriers (COE 1999a). In addition, NMFS notes that by raising Upper Pony Dam 20 feet higher and simultaneously occupying approximately 400 feet of stream that may have been capable of being developed into suitable spawning habitat, the CBNBWB project may preclude the re-establishment of naturally spawning anadromous fish above Merritt Dam for the life of the project.

Habitat Elements

Substrate/Sediment. The BA indicates that 14% of the approximately 1600 square feet of available spawning gravel identified upstream of Upper Pony Reservoir would be inundated by the proposed action. The gravel to be inundated represents the potential loss of between 30 and 300 cutthroat trout redds. In addition, the backslope of the new dam will occupy approximately 400 feet of stream and about 36 square feet of spawning gravel (COE 1999a; COE 1999b).

The BA indicates that less than 5 square feet of spawning gravel are available in lower Pony Creek. As mitigation, the ODFW and CBNBWB MOU requires a total of 195 square yards of gravel to be placed at four locations in the watershed downstream of Merritt Dam (ODFW and CBNBWB 1999). The MOU also requires that the supplemented gravel will be replaced as needed for the life of the project. NMFS concurs that the augmented gravel represents an unpredictable, yet potentially significant contribution to existing spawning habitat because: (1) Successful augmentations have been reported elsewhere (Reeves et al. 1991); and (2) if fully utilized by either species, the placed gravel could theoretically provide for approximately 13 to 55 pairs of spawning coho or 173 to 1,733 pairs of cutthroat (Bjornn and Reiser 1991). Although cutthroat trout are not likely to be limited by spawning success unless seeding is extremely low (Everest et al. 1987; Magee et al. 1996), NMFS concurs with ODFW and CBNBWB (1999) that Pony Creek may be an example of a system where spawning gravel is limiting salmonid production.

In summary, spawning substrates accessible to freshwater subpopulations of OC cutthroat will be lost in the upper watershed, but spawning gravels in lower Pony Creek will be augmented by gravel placement. Although the gravel augmentation potentially represents a significant contribution to salmonids in lower Pony Creek, NMFS anticipates the *Substrate* habitat indicator for the overall watershed would be maintained given: (1) The sediment regimes in lower Pony Creek and its tributaries will be unaffected, and (2) the recognition that developed spawning areas represent a compromise between wild and hatchery propagation (Reeves et al. 1991), rather than restoration of physical or ecological processes and function. NMFS concurs that the ODFW and CBNBWB MOU contains sufficient monitoring and maintenance of the augmented gravel, although NMFS notes that 20 yards of the augmented gravel would be placed in a reach at-risk of increased sedimentation because of the proposed flow regime (see the discussion of the *Width to Depth Ratio* habitat indicator below), and 70 yards of the augmented gravel would be susceptible to warm water releases from Merritt Dam.

Large Woody Debris. Although much of the clearing required for the new reservoir pool was accomplished prior to the listing of OC coho, additional selective cutting for wildlife purposes within a 100-foot-wide "buffer zone" surrounding the reservoir is proposed. The FEIS estimates that large woody debris recruitment into Upper Pony Reservoir is likely to be reduced for up to 50 years because of the clearing for the new reservoir, however the long-term rate of recruitment may be improved somewhat over the current condition by managing the buffer zone for wildlife habitat and water quality (COE 1999b). Proposed mitigation, including the retention of some trees in the innundation zone and wood placement will provide localized benefits to the Upper Pony Reservoir and wetlands.

In association with the proposed addition of spawning gravel, the CBNBWB and ODFW MOU would place cross logs that are twice the width of the channel at four sites in the lower Pony Creek watershed. Whether this placed wood will provide much of a ecological function beyond acting as a weir to hold gravel is dependent upon the design. Placed wood is more likely to provide high value overwintering habitat for coho if dammed pools or alcoves are created (Nickelson et al. 1992), or if cover from shade and three dimensional complexity, such as is provided in rootwads, is provided in conjunction with slow current velocity (McMahon and Hartman 1989).

In summary, the CBNBWB project will result in localized reductions and increases in large wood within the system. Therefore, NMFS finds: (1) The project will maintain the existing poor condition of the *Large Woody Debris* habitat indicator in the watershed, and (2) stream riparian management throughout the watershed will determine the degree to which PFC is attained.

Pool Frequency and Pool Quality. NMFS anticipates *Pool Frequency* would not be substantially affected because the low-gradient reach of Pony Creek affected by the altered flow regime should remain primarily pool habitat. NMFS concurs with ODFW and the CBNBWB that during the summer the proposed flow regime would be an improvement over the existing condition. The proposed increase in minimum flows should typically maintain deeper pools than the existing condition, and even deeper pools than the unregulated condition during late summer. In addition, NMFS anticipates that the proposed flow regime, which should increase 80% exceedence flows in every month of the year (CH2M HILL 1999a), may improve pool quality in much of the winter by reducing the frequency and magnitude of exceptionally low flow occurrences which occur during non-spill periods currently.

Off-Channel Habitat. Predicting the magnitude of the proposed project's effects on off-channel habitat is problematic because a quantitative instream assessment was not conducted. NMFS anticipates however, as described below in the discussion of the *Flow/Hydrology* pathway, that the proposed flow regime would significantly reduce the extent and duration of discharges capable of exceeding bankfull height and/or flooding the remnant wetland/marshes adjacent to Pony Creek. Because off-channel habitat supports a successful life history strategy for OC coho (Hartman and Brown 1987; Hartman et al. 1996), NMFS finds that the proposed flow regime would result in a loss of winter rearing habitat for OC coho at two functioning wetland/marsh sites in lower Pony Creek, and therefore represents degradation of the *Off-Channel Habitat* indicator. However, monitoring is required in order to determine the magnitude of the anticipated impact and if adaptive management would be needed.

Refugia. Until better information becomes available, NMFS believes that the following habitats in lower Pony Creek represent potential refugia: (1) Two remnant, unoccupied wetland/marsh habitats which are seasonally flooded by lower Pony Creek, and (2) densely-shaded reaches remaining in lower Pony Creek, K-Mart Fork, and Hospital Fork. These habitats represent reaches of stream that either currently or have the potential to provide relatively intact ecological functions and processes which may be important to recovery of the disturbed Pony Creek watershed and anadromous salmonids. Sedell et al. (1990) maintain that such refugia also convey spatial and temporal resistance and/or resilience to disturbed aquatic communities.

As described above for the *Off-Channel Habitat* indicator, the CBNBWB project may reduce the seasonal flooding and use of the two functional wetland/marsh habitats remaining in lower Pony Creek. Although removing approximately 180 feet of culvert near the confluence of the Hospital Fork and lower Pony Creek is a positive step towards re-establishing wetland functions and processes (COE 1999a), NMFS believes the magnitude of the improvement is rather limited compared to the existing and future condition of the stream.

In summary, the CBNBWB project is likely to reduce the extent and duration of seasonal flooding in lower Pony Creek's remnant wetland/marsh habitats, and therefore represents a degrade for the *Refugia* habitat indicator. In addition, NMFS finds the project may indirectly increase the importance of the Libby Arm South Fork and Tarheel Arm tributaries to freshwater populations of OC cutthroat by creating additional lake rearing habitat (which is already abundant) at the expense of the best remaining spawning and stream rearing habitats in the watershed.

Channel Condition and Dynamics

Width/Depth Ratio. Although substantial changes in channel morphology are not anticipated by the COE, the proposed reduction in channel maintenance flows may result in a narrowing of downstream reaches by encroaching vegetation (COE 1999b). The COE recommends selected vegetation control should occur if deemed necessary by the cities of Coos Bay and North Bend.

NMFS anticipates the low gradient reach of Pony Creek downstream of USGS gage 14324580 may experience some aggradation because sediment deliveries are likely to remain constant or increase while peak flows would be substantially reduced (Werritty 1997). Although NMFS is unable to predict the magnitude or extent of the aggradation, a reduction in rearing habitat and sedimentation of the spawning gravel to be placed in this reach may result if the reduction in flows is sufficient to exceed Pony Creek's geomorphic threshold (Burt and Mundie 1986: 67; Werrity 1997).

In summary, NMFS is unable to predict the magnitude of changes in channel morphology expected to occur or the resultant effects upon salmonids. For example, although narrowing of the channel would probably result in net loss of rearing habitat, the quality of rearing habitat may be improved by a resultant increase in woody debris accumulation and overhanging bank cover (Bustard and Narver 1975). NMFS concurs that the *Width/Depth Ratio* indicator may be degraded and concludes, as with the *Off-Channel Habitat* indicator, monitoring is required in order to determine: (1) The magnitude of the anticipated impact and (2) what, if any, adaptive management is necessary.

Streambank Condition. Approximately 400-500 feet of streambanks between Merritt Reservoir and the existing Upper Pony Dam would be permanently lost through fill of the proposed dam. Areas affected by construction would be recontoured and revegetated to hasten site restoration, and mitigation measures include ripping compacted soils, using stockpiled topsoil, and planting native vegetation (COE 1999b).

In addition, a survey of four out of the nine Upper Pony Reservoir tributaries indicates that approximately 0.85 mile of stream habitat would be inundated by the new reservoir. This 0.85 mile represents 47% of the of the stream miles in the four streams that are below impediments to upstream passage of OC cutthroat (i.e., high gradient or natural barrier, perched culvert, subterranean flow) (COE 1999a). Approximately 3.3 more miles of lake shoreline would be created by the raised reservoir. In summary, because the project would over time create additional reservoir shoreline subject to drawdown at the expense of relatively intact streambanks, NMFS finds the watershed will be permanently degraded for this indicator.

Floodplain Connectivity. As discussed for the *Flow/Hydrology* pathway and the *Off-Channel Habitat* indicator, it is difficult to quantify the affect upon floodplain connectivity. However, flooding of adjacent wetlands is likely to be reduced in magnitude and duration because the project would (1) reduce average monthly spill over Merritt Dam, which currently exceed 8 cfs from December through March, to an average of about 4 cfs in the months of January through

March in the year 2030 (COE 1999b); (2) 50% exceedence flows would be reduced by more than 2 cfs during the months of February and March with implementation of the ODFW maintenance flows; and (3) the frequency and duration of unregulated spill is expected to be appreciably reduced (CH2M HILL 1999a). Therefore, NMFS finds the proposed flow regime represents an appreciable, long-term degrade in the *Floodplain Connectivity* indicator. In addition, NMFS concludes that monitoring is required to determine the magnitude of the anticipated impact and if adaptive management would be needed because wetland inundation can be important for maintaining water quality and providing nursery areas for salmonids (Spence et al. 1996:147-148).

Flow/Hydrology

Changes in Peak/Base Flows. The raised dam would more than double the reservoir's pool area (130 acres to 273 acres) and triple the maximum storage capacity (2,150 acre-feet to 6,250 acre-feet). Providing the 1 cfs minimum flow release in 2030, as proposed in the FEIS (COE 1996b), the project would reduce the 3,300 acre-feet of water released in a normal year to lower Pony Creek, to about 800 acre-feet. With full implementation of the ODFW flow regime, however, the total amount of water released to lower Pony Creek with 2030 demand would be about half that currently released, or about 1635 acre-feet (ODFW and CBNBWB 1999).

Under the proposed operations, unregulated releases of water from Upper Pony Creek Reservoir will occur infrequently. Therefore, releases to lower Pony Creek that exceed the ODFW flow regime are anticipated to become less frequent also. Excess spill is likely to occur at Merritt Dam only in the months of January through March, whereas the existing operations spill enough water to provide an average monthly flow exceeding 5 cfs from December through April. Although the effect of the proposed project upon daily peak flows was not calculated, the predicted reduction in monthly estimations of average and 50% exceedence flows indicate that the magnitude and duration of unregulated spills over Merritt Dam would be significantly reduced (CH2M HILL 1999c; COE 1999a; COE 1999b). The COE concludes that urbanization will counteract the effects of the CBNBWB project on peak flows (COE 1999b). NMFS, however, notes: (1) Major tributaries do not contribute to Pony Creek for about a mile downstream of Merritt Dam, and (2) flows from an urbanized catchment do not necessarily provide the timing and duration of discharges required for channel and riparian maintenance (Hill et al. 1991).

Because a quantitative assessment of the effect of the altered flow regime (e.g., Incremental Flow Instream Methodology or IFIM) was not conducted, NMFS is unable to quantify the effects of the CBNBWB project upon salmonid habitat. NMFS anticipates early winter rearing and holding habitat would be improved, while late winter rearing and holding habitat would be reduced by the proposed change in 50% exceedence flows. Early outmigrants would have flow conditions improved, while late outmigrants would typically have less flow than with the current flow regime. However, minimum and low (80% exceedence) flows in lower Pony Creek would be increased substantially in every month by the ODFW flow regime (CH2M HILL 1999a). Thus, NMFS concurs the proposed flow regime should provide adequate discharge during the low flow summer months for rearing salmonids if other water quality parameters (e.g., temperature, dissolved oxygen) are not limiting. Table 3 below summarizes the estimated unregulated, current, and proposed flows released at Merritt Dam.

In summary, NMFS concludes that the ODFW flow regime improves the base flow regime for salmonids, but that uncertainty exists whether sufficient flows to attract returning spawning adult salmonids or complete juvenile migrations in the spring will be provided. In addition, NMFS concludes that peak flows will be appreciably degraded by the proposed flow regime. Therefore, reservoir operation plans similar to those the BA proposes to develop at Joe Ney Reservoir for salmonid migrations during the spring and fall/winter, as well as a suitable plan for monitoring stream flows needs to be developed for the Pony Creek watershed.

Table 3. Estimated unregulated, current, and proposed flows released at Merritt Dam.

Month	80% Exceedence Flow (cfs)		Discharge to Meet ODFW Flow Regime	50% Exceedence Flow (cfs)		Discharge to Meet ODFW Flow Regime
	Unregulated[1]	Current[2]	Proposed[3]	Unregulated[1]	Current[2]	Proposed[3]
January	9	.03	3.39	18	2.4	2.75
February	12	.15	3.20	20	7.2	2.64
March	8	.63	2.41	14	6.2	2.03
April	5.4	.12	2.62	9	4.0	2.38
May	2.6	.02	1.82	4.1	0.28	1.71
June	1.2	.02	0.91	2.2	.03	0.85
July	0.5	.02	0.96	1.0	.03	0.93
August	0.3	.02	0.98	0.4	.03	0.97
September	0.2	.02	0.99	0.3	.03	0.98
October	0.2	.01	0.99	0.3	.02	0.98
November	0.9	.02	1.94	3.0	.05	1.
December	6	.02	2.58	15	.1	2.99

Increase in Drainage Network. Construction of an estimated 0.43 mile of road would not increase the drainage network substantially, and therefore, NMFS concludes the action will maintain this habitat indicator.

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[1] From ODFW 1999c, estimated using flow data from similar streams.

[2] From COE 1999a, measured at USGS gage on Pony Creek.

[3] From COE 1999a. Given the estimated exceedence flow from AAA Fork (i.e., either 80% or 50%), this discharge represents the estimated amount of additional flow to be released at Merritt Dam in order to provide the ODFW flow regime.

Watershed Conditions

Road Density and Location. Although the current road density within the watershed is not known, the proposed road construction is not anticipated to affect this habitat indicator because only 0.43 mile of additional road would be constructed and the road would avoid steep ground, stream crossings, or cuts and fills where possible. Where such activities cannot be avoided, the BMPs emphasize minimizing ground disturbance and crossings of streams or wet areas (COE 1999b). NMFS therefore concludes the action will maintain the *Road Density and Location* indicator in the watershed.

Disturbance History. In the short-term, the proposed construction represents a significant disturbance in the upper Pony Creek watershed. In addition, the proposed project would allow the CBNBWB to meet incremental peak season demands associated with increased population growth and industrial use until 2030. As evidenced by lower Pony Creek and Pony Slough, urbanization typically creates severe and long-lasting impacts on aquatic ecosystems (Spence et al. 1996:130-134). NMFS concludes that the interrelated and interdependent effect of the project to facilitate increased urban development is likely to degrade the *Disturbance History* indicator for the entire action area over the long-term also.

Riparian Reserves. The discussions above for the *Large Woody Debris* and *Streambank Condition* indicators also describe aspects of the project's anticipated affect upon riparian vegetation within the Pony Creek watershed. In summary, reservoir riparian buffer areas would be increased while the acreage of riparian zones adjacent to fish-bearing streams in the upper watershed would be substantially reduced. In addition, the riparian area of the reservoir may deteriorate over time as water demands create a larger drawdown zone than currently exists (COE 1999b).

Although the proposed project may facilitate encroachment of riparian vegetation into the active channel of lower Pony Creek, NMFS is unable to predict the significance of the potential changes. Ligon et al. (1995) found encroaching vegetation as a result of reduced flood flows led to simplified stream channels and a loss of spawning habitat, as well as a potential loss of off-channel rearing habitat.

Therefore, NMFS concludes that streamside riparian reserves would be permanently lost in upper Pony Creek watershed. Although total acres of reservoir riparian reserves would increase, they would be adversely affected for up to 50 years by the construction, and ultimately would be of lower value to salmonids as the drawdown zone expands. In addition, riparian vegetation in lower Pony Creek needs to be incorporated into the monitoring plan developed for other habitat indicators.

<u>1. Rehabilitation of Joe Ney Dike and Replacement of Pipeline:</u>

Many habitat indicators in the Joe Ney watershed would be unaffected by the CBNBWB project. The most relevant habitat indicators affected by the proposed project are described below.

Water Quality

Water Temperature. The effects of the proposed project upon the existing water temperature regime in Joe Ney Reservoir and Joe Ney Slough are difficult to predict because no baseline information has been collected. However, based upon water temperatures measured at Merritt Reservoir, NMFS anticipates that water temperatures in the shallow reservoir are also likely to reach levels during the late spring and summer that are above those preferred and/or those stressful for rearing or smolting salmonids. By proposing reservoir operations which would increase pump capacity from 1.5 cfs to 11 cfs, and thereby enabling a much faster and sustained drawdown of the reservoir to its lowest level, NMFS also expects that the proposed project will influence water temperatures in Joe Ney Reservoir.

NMFS anticipates the most significant change to water temperatures from the existing conditions in Joe Ney Reservoir and Joe Ney Slough may occasionally occur following withdrawals from the reservoir during February and March, when minimum flows through the fishway would not be required (COE 1999a; ODFW and CBNBWB 1999).

The effects upon temperature would be most noticeable during dry[4] and normal[5] years, when the 7-foot-deep Joe Ney Reservoir could be lowered 3 to 4 feet to its minimum pool depth within a week by the increased pump capacity. Although the proposed operation plans would require withdrawals to temporarily cease if 5 cfs were not flowing through the fishway on April 1, the rate at which the reservoir would refill enough to provide downstream and upstream passage through the fish ladder would depend upon the weather (i.e., precipitation) and tributary inflow.

The NMFS believes that (1) the proposed reservoir operations represent a significant departure from current management during a time when studies from coastal Oregon streams indicate juvenile salmonids in the area would be preparing for or actually migrating downstream (Weitcamp et al. 1995; Sadro 1999); and (2) if temperature is affected, the timing of migration could adversely be affected (Spence et al. 1996:104). ODEQ (1995) recommends water temperatures not exceed 12.2°C to maintain the migratory response and seawater adaptation in juvenile salmon. Based upon temperatures taken at a nearby, deeper reservoir, the average temperatures in February and March would have exceeded 12.2°C in two and four of the five years, respectively, for which NMFS has records (CBNBWB 1999a). NMFS anticipates the shallow Joe Ney Reservoir would experience similar, if not worse, water temperatures with the proposed project.

[4] Defined as a year when annual rainfall would fall within the lower quartile of annual rainfall totals as measured from 1931 through 1994 at the North Bend Airport (CH2M HILL 1999b).

[5] Defined as a year when annual rainfall would fall within the two middle quartiles of annual rainfall totals as measured from 1931 through 1994 at the North Bend Airport (CH2M HILL 1999b).

In summary, NMFS concludes the CBNBWB project: (1) Would degrade the *Water Temperature* indicator for Joe Ney Reservoir during the months of February and March in most years, and (2) may raise water temperatures sufficiently to adversely affect physiological adaptations juvenile salmonids need to make prior to smolting.

Turbidity. Ground disturbance resulting from the dike reconstruction and the installation of a new pump intake and pipeline to Upper Pony Reservoir may temporarily increase sediment deliveries to Joe Ney Reservoir and Slough. Although short-term increases in turbidity may result, implementation of the proposed erosion control measures (e.g., seeding, biofiltration bags, siltation fences, scheduling of erosion-producing activities at appropriate times, maintenance of vegetated buffer zones) should minimize adverse effects to aquatic resources (COE 1999b).

If not managed properly however, the increased rate at which Joe Ney reservoir could be drawdown may cause rapid-drawdown landslides along the margins of the reservoir (COE 1999b). The resultant sedimentation would adversely affect salmonids in the reservoir and slough.

In summary, NMFS concludes that turbidity from construction of the CBNBWB Project will temporarily impact listed and candidate salmonids in the Joe Ney watershed, but that sufficient measures to minimize adverse effects are included in the project design. However, this finding is contingent upon: (1) The COE determining and implementing a drawdown rate for Joe Ney Reservoir which will adequately minimize the risk of landslides; (2) adequate monitoring; and (3) implementation of the permit requirements of other State and Federal agencies (i.e., ODEQ, COE, and Oregon Division of State Lands).

Other Water Quality Parameters. Although major incidents are unlikely to occur, accidental spills of fuels, oils, and other pollutants associated with construction activities could result in degradation of water quality and adversely affect salmonids. NMFS concurs with the COE that effects from accidental spills would be minimized through appropriate prevention and contingency plans (COE 1999b).

Given 2030 demand, the proposed project would reduce freshwater inflow to Joe Ney Slough by about 20% during the winter and spring, and thereby cause the salinity in Joe Ney Slough to moderately increase (COE 1999b). A unverified, one-dimensional model predicted the following effects of a reduced flow alternative during dry (June) and wet (January) seasons in the Joe Ney Slough just downstream of the dike: (1) The minimum dry season salinities would increase from a baseline of about 18.56 parts per thousand (ppt) to about 24.53 ppt (maximum salinities would remain essentially unchanged at about 27 ppt); and (2) wet season minimum and maximum salinities would increase from a baseline range of 3.02 - 13.14 ppt to about 8.01 to 14.16 ppt (COE 1999b).

Although the modeled flows are less than those proposed, the model clearly predicts that reduced flows increase salinity immediately downstream from the dike, which is the area of greatest concern to juvenile salmonids from Joe Ney Reservoir. In addition, the model predicts: (1) Salinity in Joe Ney Slough is primarily dominated by South Slough salinities, (2) a reduction in flows would likely increase salinity throughout the slough, and (3) salinity would become more constant in space and time (COE 1999b).

The indirect effects to salmonids from potential changes in the slough's estuarine ecosystem are unknown. CH2M HILL (1996b) predicts that substrate and tidal flushing would not change appreciably, but increases in average salinity in the upper slough could alter the distribution and abundance of some invertebrates. Lacking information on the species present, CH2M HILL (1996b) could not predict detailed effects on vegetation in the upper slough, however, the existing conditions were felt to probably already limit vegetation to relatively salt-tolerant species. NMFS anticipates that if fish passage between the slough and Joe Ney Reservoir is maintained, the indirect effects of the salinity increases on the availability of food would be relatively minor. Although food limitation in estuaries has been reported for chum (*Onchorynchus gorbuscha)* and chinook salmon (*O. tshawytscha*) by Percy (1992), other studies suggest that in the absence of hatchery influences, the suitability of estuarine habitats for coho and cutthroat is more related to instream cover and riparian habitat than salinity once juveniles are acclimated to saline conditions (Murphy et al. 1984; Frank et al. 1988; Tschaplinski 1988; McMahon and Holtby 1992). The timing, size, and density of hatchery releases should be temporally and spatially structured to minimize potential competition (Simenstad et al. 1982; Murphy et al. 1988).

The predicted salinities are capable of affecting newly emerged salmonid fry: (1) Giger (1972) found that salinities above 15 ppt result in substantially lower survival of newly emerged cutthroat fry; and (2) Otto (1971) found the upper incipient lethal salinity for coho fry was 22-25 ppt in May. However, cutthroat fry generally remain in upper tributaries during the first summer (Trotter 1989; Johnson et al. 1999), and therefore, few cutthroat fry would be exposed to lethal conditions; Scott and Crossman (1973:180) however, report that cutthroat fry in some areas move directly out of small streams into large rivers or lakes. Although coho fry would be more likely to experience the high salinities immediately downstream of Joe Ney Dike, NMFS concludes that given appropriate reservoir operations, the impact to the coho population would likely be minor because: (1) The fish ladder would provide access to freshwater, and (2) many coho fry moving downstream would be displaced because upstream habitat was fully occupied (Sandercock 1991).

In summary, the CBNBWB project is anticipated to raise the salinity of Joe Ney Slough. Although the effects are anticipated to be minor, NMFS concludes: (1) Fish passage and appropriate reservoir operations need to be maintained, and (2) the magnitude and duration of the predicted salinity increases should be verified.

Habitat Access

The proposed project would replace the existing fish ladder at Joe Ney Dike with a more permanent structure of similar design. The proposed design has been approved by NMFS to provide for adult and juvenile passage at a flow of 5 cfs. However, volitional movement of adults or juveniles between the estuary and reservoir would not necessarily be provided during February and March, or between July 1 and the onset of fall rains in October because the proposed reservoir operations do not require a minimum flow release during those periods (ODFW and CBNBWB 1999). The influence of the proposed February and March drawdowns on the movement of salmonids is of particular concern to NMFS because recent studies indicate: (1) The proposed drawdown in February and March could precipitate a premature emigration of salmonids into Joe Ney Slough (PacifiCorp 1995: Volume 26: 7-25), and (2) juvenile OC coho, OC cutthroat, and OC steelhead are likely to be moving towards the estuary during this period (Sadro 1999).

Volitional movement of juveniles between the estuary and freshwater is of importance to local populations of OC coho and OC cutthroat because such movement may be common in the Coos Bay estuary, and these movements may provide benefits to the individual, as well as the subject population (Tschiplinski 1988; Sadro 1999; Young 1999). For example, studies show that survival, swimming performance, and/or growth rates of OC coho and OC cutthroat juveniles may be directly affected by the predicted dry season salinities in Pony Slough: (1) Crone and Bond (1976) found that coho fry preferred a salinity of 14 ppt or less, although acclimation to higher salinities is likely if access to a low salinity refuge in the estuary is provided; (2) Otto (1971) found salinity tolerance was clearly increased by exposure to dilute salinities, maximum pre-smolt growth of coho salmon occurred at salinities of 5 to 10 ppt, and growth was inhibited from June to September at salinities above 10 ppt; (3) Otto and McInerney (1970) reported that after an initial preference of 8 ppt, coho pre-smolts demonstrated a seasonal increase in salinity preference, but at no time prior to smolt transformation did coho juveniles prefer salinities exceeding 14 ppt; (4) Glova and McInerney (1977) found coho smolts exhibited a distinct maximum swimming performance near 13 ppt, and underyearling coho should be able to perform important locomotor-dependent activities in salinities up to 20 ppt. Observations by Moser et al. (1991) suggest that estuarine residence by coho smolts may be necessary for them to adjust their osmoregulatory capability, orient for their return migration, feed, or reduce their vulnerability to predators. These studies and the discussion above suggest the proposed reservoir operations are likely to adversely affect OC coho by limiting unimpeded access between the slough and Joe Ney Reservoir during their life history when juvenile coho may have a physiological preference or need to negotiate the fish ladder. In addition, downstream migration of OC cutthroat and OC steelhead kelts (spawned-out adults) and the upstream migration of late spawning OC steelhead could be interrupted if sufficient flows are not provided through the Joe Ney Dike fishway during February and March.

Therefore, NMFS concludes that *Habitat Access* during the months of February and March would be degraded by the CBNBWB project. Although passage for listed and candidate salmonids would be provided during months when peak upstream and downstream migration typically occurs, NMFS finds smolt outmigration timing exhibits considerable interannual variation (Weitcamp et al. 1995), and that monitoring from nearby Winchester Creek indicates juvenile OC coho, OC cutthroat, and OC steelhead are moving downstream by February (Sadro 1999). Given existing information, NMFS concludes the Joe Ney Dike fishway should provide upstream and downstream passage for listed and candidate salmonids during February and March.

Flow/Hydrology

Although the BA (COE 1999a) and the FEIS (COE 1999b) analyze a withdrawal rate of 8 cfs, the maximum rate at which water could be pumped from the Joe Ney Reservoir to Upper Pony Reservoir would reach 11 cfs with implementation of the ODFW and CBNBWB MOU (ODFW and CBNBWB 1999). Thus, NMFS estimates diversion from Joe Ney Reservoir would increase from approximately 1.0 mgd to 7.18 mgd with the 11 cfs withdrawal (COE 1999b).

The COE anticipates average monthly flows released to Joe Ney Slough, which currently range from 13-19 cfs from November through February, would be reduced by 2-3 cfs with the 8 cfs diversion. Average monthly flows in September, October, March, April, and May would remain essentially unchanged from the existing condition, while the average monthly flow in June would increase by over 1.5 cfs (COE 1999b). Although dampened, withdrawal of either 8 or 11 cfs would provide a flow regime maintaining the timing, magnitude, duration, and spatial distribution of peak, high, and low flows of the existing and unregulated flow regime in most months (COE 1999a). In addition, by not pumping during the month of June, the proposed operations would extend freshwater releases to Joe Ney Slough for about a month longer than currently occurs during normal and dry years. However, CH2M HILL (1999c) estimates the peak and base flow releases to Joe Ney Slough during February and March could be severely reduced in normal and dry years with the 11 cfs diversion.

In summary, the current flow regime, which could be characterized as "at-risk" because of the withdrawals and reservoir operation, would be maintained in most months. However, NMFS concludes the flow regime provided by the ODFW and CBNBWB MOU during the months of February and March represents a shift from the natural flow regime at a critical time for juvenile salmonids in preparation for entry to saltwater (Wedemeyer et al. 1980; Percy 1992; Spence et al. 1996:102-104), and therefore degrades the *Flow/Hydrolog*y indicator.

<u>2. Dike Removal in Catching Slough</u>

Removing six, 200-foot sections of a 2000-foot-long dike which is currently constraining Catching Slough would re-establish estuarine functions and processes to 19.4 acres of pasture/freshwater wetland. Any short-term impacts to salmonids are expected to be minor because the excavation should result in only temporary disturbance to nearby fish, and the anticipated increases in turbidity should be localized and of short duration. Although the size of restored area is small relative to the amount of impacted habitat in the slough and Coos Bay estuary, positive long-term benefits to juvenile salmonids should result from restoration of off-channel rearing habitat and estuarine processes at the site (as opposed to the watershed or sub-basin). Chinook juveniles would likely benefit the most from the mitigation, although the off-channel habitat would also be available to OC coho and OC cutthroat during their migration through the slough (COE 1999a).

B. Cumulative Effects

Cumulative effects are defined as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR § 402.02). Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes. In addition, non-Federal actions that require authorization under section 10 of the ESA will be evaluated separately. Therefore, these actions are not considered cumulative to the proposed action.

Based upon recent and ongoing developments in the lower Pony Creek watershed, NMFS concurs with the COE that the cumulative effects in lower Pony Creek can be expected from increased impermeable surface, loss of riparian vegetation, decreased woody debris recruitment, and decreased water quality (e.g., temperature, sedimentation, pollution); all of which could adversely affect the biological productivity of the watershed and salmonids (COE 1999a). Accordingly, NMFS has developed reasonable and prudent steps (see Section VII of this Opinion) to address cumulative impacts in Pony Creek.

C. Summary

Table 4 summarizes the environmental baseline, as well as the effects (direct, indirect, interrelated and interdependent, and cumulative) of implementing the CBNBWB project. NMFS (1996) defines the three categories of environmental baseline function and the three effects determinations. The analyses and studies supporting the determinations, where available, are provided in this Opinion's description of the **Environmental Baseline** and from the **Analysis of Effects**. Where information was not available, professional judgement was used.

Unless noted otherwise, the "degrade" and "restore" determinations in Table 4 represent long-term effects relative to attainment of PFC at the watershed scale. That is, a "restore" means to change the function of "at-risk" indicator to "properly functioning", or to change the function of a "not properly functioning" indicator to "at-risk" or "properly functioning". A "degrade" means to change the function of an indicator for the worse by either impairing properly functioning habitat, appreciably reducing the functioning of already impaired habitat, or retarding the long-term progress of impaired habitat towards PFC at the watershed and population scale (Attachment 1; NMFS 1996).

ODFW has begun implementing habitat restoration strategy within the in the Coos Basin, and predicts a rapid increase in the coho population if ocean conditions improve (Reimers et al.

1995). In addition, NMFS is aware of multiple habitat improvements undertaken in the action area by the Coos Watershed Association (CWA) (Donnelly 1999). Despite these habitat improvements, NMFS is not assured that the habitat factors for decline of the OC coho within the action area have been substantially reversed (NMFS 1997). Although ODFW's restoration strategy and the restoration efforts undertaken by the CWA are commendable, restoration of aquatic ecosystems in the action area will occur over time as: (1) Anthropogenic impacts are reduced (Kauffmann et al. 1997); (2) watershed analyses are completed; and (3) restoration efforts continue. Currently, however, the improvements have not been as extensive, or in place long enough to "restore" habitat indicators or the natural processes that maintain those indicators within the action area.

Table 4. Summary checklist of environmental baseline and effects of the CBNBWB project (including indirect and cumulative effects) on relevant indicators in the Coos Bay sub-basin.

MATRIX PATHWAYS & INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING	RESTORE	MAINTAIN	DEGRADE
Water Quality						
Temperature		CBET	PC, JNC		PC, CBET	JNC (F&M)
Turbidity			ALL		All Long-Term	All Short-Term
Other Water Quality			ALL		CBET	PC, JNC
Habitat Access						
Physical Barriers		JNC	PC, CBET		PC, CBET	JNC (F&M)
Habitat Elements						
Substrate/Sediment			ALL		ALL	
Large Woody Debris			ALL		JNC, CBET	PC
Pool Area (%)		ALL			ALL	
Pool Quality			ALL	PC	JNC, CBET	
Off-Channel Habitat		JNC	PC, CBET		JNC, CBET	PC
Refugia		ALL			CBET	PC
Channel Condition & Dynamics						
Width/Depth Ratio		ALL			JNC, CBET	PC
Streambank Condition		ALL			JNC, CBET	PC
Floodplain Connectivity	JNC	PC	CBET		JNC, CBET	PC
Flow/Hydrology						
Changes to Peak/Base Flows		JNC, CBET	PC	PC (base)	CBET	PC (peak) JNC (F&M)
Increase in Drainage Network		ALL			ALL	
Watershed Conditions						
Road Dens. & Location /Drainage Network			ALL		ALL	
Disturbance History			ALL			ALL
Riparian Reserves			ALL		JNC, CBET	PC

PC = Pony Creek
JNC = Joe Ney Creek
CBET = Coos Bay Estuary and Other Tributaries
F&M = February and March

VI. CONCLUSION

As described in Attachment 1, NMFS utilizes the following steps in conducting analyses of habitat-altering actions under section 7 of the ESA:

1. Status of OC Coho Salmon Within the Action Area

Within the action area, NMFS finds a substantial upward trend in coho spawning abundance from 1990-1994 tapered off in 1995 and 1996, followed by a marked decline in 1997 (Jacobs and Nickelson 1998). Preliminary peak counts from the 1998-99 spawning season suggest a slight improvement over 1997.

2. Biological Requirements of OC Coho

For this consultation, NMFS finds that the biological requirements of OC coho are best defined in properly functioning condition (PFC). Properly functioning condition is the sustained presence of natural habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation. Therefore, PFC constitutes the habitat component of a species' biological requirements.

If a proposed action would be likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it will usually be found likely to jeopardize the continued existence of the species or adversely modify its critical habitat or both.

NMFS has used the *Matrix of Pathways and Indicators* (MPI) for describing current freshwater habitat conditions, determine the factors limiting salmon production, and identify sensitive areas and any risks to PFC.

3. Relevance of the Environmental Baseline in the Action Area to OC Coho's Current Status

Based on the best information available regarding the current status of OC coho salmon and the poor environmental baseline conditions within the action area, the NMFS concludes that not all of the biological requirements of OC coho within the affected watersheds and/or action area are currently being met under the environmental baseline. Significant improvements in habitat conditions are needed to meet the biological requirements for survival and recovery of OC coho. Any further degradation of these conditions would have a significant impact due to the amount of risk OC coho presently face under the environmental baseline. In summary, the environmental baseline of critical habitat in the watersheds and the action area can be characterized as either "at-risk" or "not properly functioning" currently (see Table 4).

4. Determine the Effects of the Action on the Species

After assessing the direct and indirect effects of the CBNBWB project, NMFS concludes 11 of 18 habitat indicators would be degraded to varying extent and duration at the watershed scale. Of the 11 affected indicators, NMFS anticipates appreciable, long-term degradation of *Off-Channel Habitat*, *Floodplain Connectivity*, and *Peak Flows* in the Pony Creek watershed, and therefore concludes essential features of OC coho critical habitat (i.e., water quantity, cover/shelter, food, and space) would be adversely affected for the life of the project. Similarly, NMFS anticipates appreciable, long-term degradation of *Water Temperature, Physical Barriers*, and *Base Flows* indicators in the Joe Ney watershed during months when OC coho juveniles would be vulnerable to environmental influences prior to or during smoltification.

In addition, the proposed project will indirectly facilitate increased human disturbance and urban growth within the action area for another 25 to 30 years. As described in the literature and evidenced by the lower Pony Creek watershed, impacts of urbanization on environmental pathways and habitat indicators critical to salmonids are severe and long-lasting (Imhof et al. 1991; Spence et al.1996:130-134).

5. Consider Cumulative Effects in the Action Area

The NMFS concludes lower Pony Creek would be impacted by increased impermeable surface, loss of riparian vegetation, decreased woody debris recruitment, and decreased water quality (e.g., temperature, sedimentation, pollution), all of which could adversely affect the biological productivity of the lower watershed and retard the long-term progress of impaired habitat toward PFC. Although the rate of habitat degradation in lower Pony Creek may slow as management practices improve, NMFS identifies an immediate concern to provide for the following essential features of coho salmon critical habitat in stream reaches remaining accessible to OC coho: (1) Water temperature; (2) cover/shelter; (3) food; and (4) riparian vegetation. Based upon recent and ongoing development in the lower watershed, these essential elements must be addressed forthwith in order to maintain remnant patches of refuge habitat in the lower watershed and to ensure OC coho benefit from the augmented gravel and flows provided by the ODFW and CBNBWB MOU.

Although the best spawning and rearing habitat remaining in the Pony Creek watershed is above Upper Pony Dam (COE 1999a), NMFS has proposed that habitat which is currently accessible may be sufficient for the conservation of the OC coho ESU (May 10, 1999; 64 FR 24998). At the same time, NMFS believes that section 7 consultations need to address the negative effects of dams on downstream fish habitats for this strategy to be effective.

6. Conclusions

A. Proposed Critical Habitat for OC Coho

The NMFS has determined, based on the information, analysis, and assumptions described in this Opinion, that the CBNBWB project would result in the destruction or adverse modification of proposed critical habitat for OC coho. In arriving at this determination, NMFS considered the current status of the OC coho ESU; the biological requirements of OC coho; the environmental baseline conditions; the direct and indirect effects of implementing the CBNBWB project; and the cumulative effects of actions anticipated in the action area.

The NMFS finds that habitat conditions in the Pony Creek and Joe Ney watersheds (7,360 acres) are integral to the Coos Bay sub-basin because: (1) The 119,000-acre action area is comprised of approximately 30 small watersheds, and (2) all available information indicates that the entire action area contains habitat that is either "at-risk" or "not properly functioning." Although other watersheds within the action area may have higher productivity and/or potential, NMFS concludes that given the existing condition, impairing properly functioning habitat, appreciably reducing the functioning of already impaired habitat, or retarding long-term progress of impaired habitat toward PFC at the watershed scale represents an adverse modification of proposed critical habitat for OC coho salmon.

B. OC Coho Salmon

The NMFS has determined, based on the information, analysis, and assumptions described in this Opinion, that the CBNBWB project is likely to jeopardize the continued existence of OC coho. Utilizing the same steps outlined above for critical habitat, NMFS finds that the CBNBWB project, in conjunction with interrelated and interdependent actions and cumulative effects, would degrade the environmental baseline and hinder attainment of PFC at a scale relevant to the listed ESU (i.e., the Pony Creek and Joe Ney watersheds). As described above, the Pony Creek and Joe Ney watersheds are integral to the OC coho within the action area because: (1) The 119,000-acre Coos Bay sub-basin is comprised of approximately 30 small watersheds, and (2) all available information indicates that the entire action area contains habitat that is either "at-risk" or "not properly functioning."

Based on the best information available regarding the current status of OC coho and the poor environmental baseline conditions within the action area, the NMFS finds that not all of the biological requirements of OC coho within the affected watersheds and/or action area are currently being met under the environmental baseline. Any further degradation of these conditions would have a significant impact due to the amount of risk OC coho presently face under the environmental baseline.

Therefore, NMFS concludes that OC coho cannot be expected to survive, with an adequate potential for recovery, because the combined effects of the proposed CBNBWB project, interrelated and interdependent actions, and cumulative effects would appreciably degrade the environmental baseline for the long term at a time when significant improvements in habitat conditions within the action area are needed to meet the biological requirements of OC coho. As explained in the **Analysis of Effects** and depicted in Table 4, implementation of the CBNBWB project as proposed, would lead to appreciable, long-term degradation of multiple habitat indicators in the Pony Creek and Joe Ney watersheds, as well as facilitate long-lasting impacts associated with additional urbanization in the action area. As described in Attachment 1, actions that affect habitat have the potential to affect population abundance, productivity, and diversity, and these effects are particularly noticeable when populations are at low levels such as experienced by OC coho within the ESU and action area.

Although long-standing alterations in the Pony Creek and Joe Ney Creek watersheds have produced long-term, and in some cases, permanent reductions in their productivity, NMFS concludes that over time, improved management practices, the ODFW and CBNBWB MOU, and the continued recovery of impaired habitat provided by this Opinion's reasonable and prudent alternative should allow Joe Ney and Pony Creek watersheds to contribute to the recovery of OC coho salmon. At a minimum, both watersheds are likely to have the potential in the short-term to seasonally provide valuable rearing habitat for coho juveniles from nearby streams (Lorenz and Koski 1995).

C. OC Cutthroat Trout

Utilizing the same steps outlined above for critical habitat and OC coho, NMFS finds that the CBNBWB project, in conjunction with interrelated and interdependent actions, and cumulative effects, would degrade the environmental baseline and hinder attainment of PFC at a scale relevant to the candidate OC cutthroat ESU.

Based on the best information available regarding the poor environmental baseline conditions within the action area, the NMFS finds that not all of the biological requirements of OC cutthroat within the affected watersheds and/or action area are currently being met under the environmental baseline. Any further degradation of these conditions would have an adverse impact due to the amount of risk OC cutthroat presently face under the environmental baseline.

In particular, the impacts of the project upon water levels in Joe Ney Reservoir during the months of February and March, and the resultant interruption of unimpeded passage to and from the estuary represent a significant degradation of existing conditions for anadromous cutthroat. In addition, the project would create additional lacustrine habitat (which is already abundant) at the expense of the best remaining stream rearing and spawning habitat in the Pony Creek watershed. Furthermore, if not curtailed, cumulative and interrelated effects from recent and future developments will continue to erode the already impaired habitat conditions found in lower Pony Creek, and will prevent OC cutthroat from benefitting from the ODFW flow regime.

In summary, the CBNBWB project would appreciably diminish the value of OC cutthroat habitat in the Pony Creek and Joe Ney Creek watersheds. NMFS concludes that improved management practices, the ODFW and CBNBWB MOU, and the recovery of impaired habitat provided by this Opinion's reasonable and prudent alternative should also benefit OC cutthroat trout.

D. OC Steelhead

The NMFS has determined, based on the information, analysis, and assumptions described in this Opinion, that the CBNBWB Project is not likely to jeopardize the continued existence of OC steelhead. Utilizing the same steps outlined above for critical habitat, NMFS finds: (1) OC steelhead have not been documented in the Pony Creek and Joe Ney Creek watersheds for nearly 30 years; (2) neither Pony Creek or Joe Ney watershed may have ever been a significant contributor to the OC steelhead ESU; and (3) the environmental baselines in the Pony Creek and Joe Ney Creek watersheds are such that neither watershed may contribute appreciably to the action area's production of naturally reproducing steelhead trout in the near future. However, NMFS finds that over time, improved management practices, the ODFW and CBNBWB MOU, and the recovery of impaired habitat provided by this Opinion's reasonable and prudent alternative should also benefit OC steelhead.

VII. REASONABLE AND PRUDENT ALTERNATIVE

The regulations implementing section 7 of the ESA (50 CFR 402.2) define reasonable and prudent alternatives (RPAs) as alternative actions, identified during formal consultation, that: (1) Can be implemented in a manner consistent with the intended purpose of the action, (2) can be implemented consistent with the scope of the action agency's legal authority, (3) are economically and technologically feasible, and (4) would, in NMFS's opinion, avoid the likelihood of jeopardizing the continued existence of listed species and avert the destruction or adverse modification of critical habitat.

While the ESA does not preclude an agency from taking an action that adversely modifies proposed critical habitat, the COE is reminded that if critical habitat for OC coho is designated prior to completion of the action, the COE may be required to modify or suspend the action at that time pending resolution of formal consultation under section 7. Should OC steelhead be listed under the ESA, or should critical habitat for Oregon Coast coho salmon be designated, the NMFS expects this conference opinion to serve as the basis for a biological opinion on implementation of the action, pursuant to 50 CFR § 402.10(d). OC coho critical habitat has been proposed (May 10, 1999; 64 FR 24998) and it includes much of the CBNBWB project area. NMFS will complete a final rule as soon as practicable, and anticipates designation of critical habitat to be completed by May 10, 2000. NMFS concluded that OC cutthroat warrants classification as a candidate species (April 5, 1999, 64 FR 16397), although the FWS will assume regulatory jurisdiction over OC cutthroat forthwith (NMFS and FWS 1999).

The NMFS, having determined that the CBNBWB project is likely to jeopardize the continued existence of OC coho and result in the destruction and adverse modification of proposed critical habitat for OC coho, has identified an RPA that would avoid the likelihood of jeopardizing the continued existence of OC coho and avert adverse modification or destruction of proposed critical habitat. NMFS has developed the RPA in conjunction with the COE and CBNBWB and found it consistent with the regulatory requirements outlined above. The RPA consists of three components: (1) Minimize effects from Joe Ney and Upper Pony reservoir operations upon OC coho salmon habitat, (2) develop a cooperative adaptive monitoring plan to guide CBNBWB operations plans and ensure adequate water quality and quantity for OC coho in Pony and Joe Ney creeks, and (3) conservation planning that will maintain and restore essential features of coho salmon critical habitat in the lower Pony Creek watershed. NMFS expects the COE will enforceably condition its oversight of the CBNBWB project to require full implementation of each component of this RPA. The criteria for each component are described below:

1. Minimize effects from Joe Ney and Upper Pony Creek reservoir operations upon OC coho habitat by implementing each of the measures below. Unless described otherwise, all measures below must be maintained as described until the CBNBWB project is removed.

    a. With the exception as described below, flow through the Joe Ney fishway shall be a minimum of 5 cfs, or natural inflow to the Joe Ney Reservoir, whichever is less, during the months of October through June.

        i. During the month of February the COE, CBNBWB, and NMFS, in coordination with ODFW, shall negotiate mutually agreeable reservoir operations when pumping from Joe Ney Reservoir would preclude flow of 5 cfs through the fishway.

    b. The COE shall require the CBNBWB to develop Operations Management Plans for Joe Ney and Pony Creek reservoirs that provide for adequate coho migration over the life of the project. The management plans shall be developed in cooperation with the ODFW and NMFS prior to altering current operations. The COE shall require the CBNBWB to implement an adaptive approach that provides a high assurance of meeting peak season water demands and identifies the timing and magnitude of discharges required for coho migration during the months of April, May, October, November, December, and January.

2. The COE shall require the CBNBWB to develop a cooperative adaptive monitoring plan that will guide reservoir operations and ensure adequate water quality and quantity for OC coho in Pony and Joe Ney creeks for the life of the project. Unless otherwise stated, the elements of the plan shall be monitored for 10 years, until there is mutual agreement between NMFS and the COE that monitoring can be discontinued, or until OC coho are no longer listed under the ESA, whichever is less. The cooperative adaptive monitoring

plan would supplement monitoring already proposed by the COE in the FEIS and by the CBNBWB (CH2M HILL 1999d), and shall be approved by NMFS by December 1, 2000.

a. Applicable and measurable parameters, as well as success criteria, shall be included in the monitoring plan from which: (1) Assumptions utilized in the assessment of the project would be verified, (2) essential elements of proposed critical habitat would be evaluated, and (3) decisions on reservoir operations and/or success of the restoration strategy would be made. Accordingly, NMFS suggests the plan include the following parameters, locations, and/or sampling schedules, but is interested in developing details of the plan with the COE and other cooperating agencies or entities (hereafter referred to as the cooperators):

   i. To assess the downstream effects of reservoir releases on OC coho, collect baseline reservoir water column profiles (temperature and dissolved oxygen), and pH measurements in Merritt, Upper Pony, and Joe Ney reservoirs in late summer per protocols recommended by ODEQ. If possible, the sampling shall be conducted once prior to alterations in operations.

   ii. To assess the potential for water temperatures to adversely affect OC coho, monitor water temperatures per ODEQ protocol to determine the 7 day rolling average of the daily maximum from the months of February to November for a period of two consecutive years, and thereafter per recommendations of the cooperators. Potential monitoring sites include: (1) Pony Creek at Ocean Boulevard ; (2) lower K-Mart Fork; (3) Hospital Fork near Thompson Road; (4) lower Pony Creek; (5) South Fork Joe Ney Creek; (6) Northwest Fork Joe Ney Creek; (7) North Fork Joe Ney Creek; (8) Joe Ney Reservoir, and (8) Joe Ney Dike Fishway.

   iii. To assess the potential for changes in channel conditions and riparian vegetation to adversely affect OC coho and to determine bankfull discharge, establish permanent stream channel cross-sections of lower Pony Creek per USGS protocols at: (1) The new gage site to be established for monitoring ODFW maintenance flows, and (2) in one of the wetland/marsh habitat reaches. Re-survey the cross-sections annually for two consecutive years and thereafter at intervals agreed to by the cooperators.

   iv. To evaluate the loss of floodplain connectivity and off-channel habitat in lower Pony Creek, establish a staff gage at the wetland/marsh adjacent to the North Bend High School. Monitor the depth of inundation monthly from October through June for three consecutive years, and thereafter as agreed to by the cooperators.

v. To assess the effects of water withdrawals upon OC coho habitat suitability in the affected estuaries, measure salinity at Joe Ney and Pony sloughs during consecutive low and high tides once a month from October through July. Conduct the sampling at Joe Ney Slough immediately downstream of Joe Ney Dike. If possible, sampling shall be done before and after alterations in operation of the reservoirs.

vi. To assess effects of the CBNBWB project upon OC coho and to evaluate the effectiveness of efforts to conserve their habitat in lower Pony Creek, monitor aquatic macroinvetebrate communities per techniques acceptable to ODEQ for evaluating Biological Criteria at 4 sites in the lower Pony Creek watershed for the next 10 years. The location and sampling frequency shall be coordinated by the cooperators but assuming pre-project sampling can be accomplished, NMFS anticipates that a reference site would be monitored up to 5 times in the next 10 years, while the other 3 sites would be measured up to 3 times each.

vii. Provide an annual monitoring report by December 31 of each year of operations to NMFS and the cooperators on the implementation of each component of the RPA.

3. The COE shall require the CBNBWB to participate in efforts to conserve essential features of coho salmon critical habitat in the lower Pony Creek watershed.

a. The CBNBWB, in cooperation with North Bend School District No. 13, Coos County, and the cities of North Bend and Coos Bay, shall encourage the development of a conservation strategy for maintaining and restoring critical riparian functions in the following stream reaches (hereafter referred to as the restoration reaches): (1) Pony Creek, from RM 2.3 to approximately RM 1.9 (USGS gage 14324580 to North Bend city limits); (2) Hospital Fork, from headwaters to Thompson Road (approximately 0.75 miles total); (3) K-Mart Fork, from Ocean Boulevard to Pony Creek confluence (approximately RM 0.75 to RM 0); (4) Pony Creek, from Walnut Avenue to K-Mart Fork confluence (approximately RM 1.6 to RM 1.5), and (5) Pony Creek, from Newmark Street to Crowell Lane (approximately RM 1.0 to RM 0.5). Although the most effective strategy will be one developed by the participants and adjusted as indicated by monitoring, the strategy should initially include the actions described below:

i. The CBNBWB shall encourage the adoption or application of the following conservation principles in its efforts to maintain and restore OC coho habitat in the lower Pony Creek watershed. Where site conditions allow, promote riparian management that will effectively provide shade, bank stability, detritus, and where appropriate, large wood. Most of the restoration reaches already retain these characteristics or appear capable of growing sufficient vegetation with proper riparian zone delineation and management. Technical assistance or examples of riparian management guidelines from other municipalities may be obtained through the Coos Watershed Association, ODFW, and/or NMFS.

ii. Encourage, where appropriate, beaver dams or woody debris accumulations that will provide low velocity water and flood wetlands adjacent to the restoration reaches.

iii. Encourage the maintenance and restoration of OC coho access to the restoration reaches through physical barriers such as culverts and tidegates.

iv. Encourage the development of methods to reduce pulses of urban pollution through stormwater improvements and/or watershed pollution prevention programs.

The RPA is designed to minimize or avoid adverse effects to OC coho and to essential features of proposed critical habitat for OC coho salmon. Proper implementation of the RPA will minimize effects from Joe Ney and Upper Pony reservoir operations upon OC coho habitat, provide monitoring that will guide CBNBWB operations and ensure adequate water quality and quantity for OC coho in Pony and Joe Ney creeks, and lead to conservation planning in lower Pony Creek. Implementation of the RPA, in conjunction with other mitigation proposed for the CBNBWB project, will begin to maintain and restore essential features of coho salmon critical habitat in the lower Pony Creek watershed and result in an improvement in the environmental baseline in the action area. Adoption of the RPA is therefore not likely to result in the adverse modification or destruction of essential features of proposed critical habitat. Because this Biological and Conference Opinion has found jeopardy and destruction/adverse modification of proposed critical habitat, the COE is required to notify NMFS of its final decision on the implementation of the RPA.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed, proposed, and candidate species, to minimize or avoid adverse modification of critical habitat, to develop additional information, or to assist the Federal agencies in complying with their obligations under section 7(a)(1) of the ESA. The NMFS believes the following conservation recommendations are consistent with these obligations and therefore should be implemented by the COE:

1. The proposed Upper Pony Dam outlet works should be screened per NMFS' 1995 Juvenile Fish Screen Criteria for salmonid fry in order to prevent entrainment and subsequent injury or mortality to OC cutthroat.

2. The COE should screen the CBNBWB water treatment plan intake at Merritt Dam per NMFS' 1995 Juvenile Fish Screen Criteria.

3. The COE should investigate the feasibility of removing or lowering Merritt Dam in order to allow the restoration of PFC to all or a significant portion of 1.5 miles of stream habitat between the Merritt and Upper Pony dams.

4. The CBNBWB should cooperate with landowners to achieve riparian management zones (RMZ) that provide bank stability, stream shading, sediment filtration, detrital nutrient load, and the delivery of large woody debris from native vegetation on both sides of the following fish-bearing reaches of stream or estuary: (1) Tarheel Arm and Libby Arm South Fork tributaries to Upper Pony Reservoir; (2) Northwest Fork, North Fork, and South Fork tributaries to Joe Ney Reservoir; and (3) Joe Ney Slough immediately downstream of Joe Ney Dike; and (4) Pony Creek and Slough between Virginia Avenue and Crowell Lane.

In order for the NMFS to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or their habitat, the NMFS requests notification of the implementation of any conservation recommendations.

IX. REINITIATION OF CONSULTATION

Reinitiation of this consultation is required: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information (e.g. monitoring) reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR § 402.16).

X. REFERENCES

Section 7(a)(2) of the ESA requires biological and conference opinions to be based on "the best scientific and commercial data available." This section identifies the data used in developing this Opinion in addition to the BAS and additional information requested by the NMFS.

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XI. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary; they must be implemented by the action agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered in this incidental take statement. If the COE (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures. Incidental takings resulting from the agency action, including incidental takings caused by activities authorized by the agency, are exempted from the taking prohibition by section 7(o) of the ESA, but only if those takings are in compliance with the specified terms and conditions.

A. Amount or Extent of the Take

The NMFS anticipates that the action covered by this Opinion has more than a negligible likelihood of resulting in incidental take of OC coho salmon because of detrimental effects upon multiple habitat indicators and pumping of water from Joe Ney Reservoir. The subject action, however, as described in the Opinion and modified by the RPA, is expected to result in minimal incidental take of proposed and listed species in the action area. Effects of the action such as these are largely unquantifiable, but are not expected to be measurable as long-term effects on the species' habitat or population levels. Therefore, even though the NMFS expects a low level of incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable the NMFS to estimate a specific amount of incidental take to the proposed and listed species themselves. In instances such as these, the NMFS designates the expected level of take as "unquantifiable." Based on the information in the BA and revised BA, the NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the action covered by this Opinion.

B. Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate for the COE to minimize and reduce the anticipated level of incidental take of the listed species. These reasonable and prudent measures are in addition to, or refinements of, the mitigation measures proposed by the COE in the FEIS, BA, associated transmittals, and the ODFW and CBNBWB MOU.

Merritt Dam and Joe Ney Dike Minimum Flow Releases

1. To ensure that minimum flows to maintain and enhance OC coho salmon habitat are provided on a continuous basis, instream flow releases from Merritt Dam and Joe Ney Dike shall be measured and recorded by the CBNBWB.

Joe Ney Reservoir Pump Station Operations

2. Joe Ney Reservoir Pump Station operations and juvenile fish screen design shall minimize take of juvenile OC coho salmon.

Construction Impacts

3. Adverse impacts from construction associated with alterations to upper Pony Creek and Merritt dams shall be minimized.

4. The effectiveness of measures to control erosion and maintain water quality shall be monitored in a consistent manner.

Landslide Impacts

5. The drawdown of Joe Ney Reservoir shall be managed to minimize the risk of landslides and the resultant impacts to OC coho.

C. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the COE and the CBNBWB must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

Merritt Dam and Joe Ney Dike Minimum Flow Releases

1. The COE shall ensure that recording of recording instream flow releases from Merritt Dam and Joe Ney Dike meet the following criteria:

    a. Daily flows shall be measured and recorded continuously per USGS protocols at the point of release, or at a suitable location downstream from Merritt Dam and Joe Ney Dike.

    b. The minimum flow releases shall be measured and recorded using equipment and techniques that ensure the data shall be of sufficient quality to be published in the

c. annual Oregon hydrologic data report or an equivalent annual monitoring report that shall be provided to NMFS.

Joe Ney Reservoir Pump Station Operations

2. The COE shall ensure that the Joe Ney Slough Pump Station operations and juvenile fish screen design meet the following criteria:

   a. The CBNBWB shall limit diversion of water to 3 cfs when water surface elevations in Joe Ney Reservoir fall below elevation 6 feet 1 inch.

   b. The pump screens shall be equipped with a reliable, fully functional cleaning system that is capable of removing any debris load from the entire screen mesh.

   c. For the first month of operation, the screens shall be monitored and photographed at least once a day (or as many times as required to maintain the entire screen mesh clean of debris). Thereafter, NMFS and the CBNBWB shall cooperatively agree upon an appropriate cleaning schedule to be included in the Joe Ney Reservoir Operations Plans. NMFS expects the screens may require more maintenance than the CBNBWB anticipates, and that the required maintenance schedule may vary depending upon the season.

   d. The pump screens shall have a maximum slot size (including tolerances) of 0.0689 inches (1.75 mm) in the narrow direction.

   e. The CBNBWB shall allow NMFS to inspect the pump station and screens during normal working hours.

Construction Impacts

3. Construction shall meet special conditions for Removal/Fill Permit No. RF-13776, including, but not limited to:

   a. Turbidity shall not exceed 10% above natural stream turbidities as a result of the project, except as provided per OAR 340-41, and all practicable erosion control measures have been implemented.

   b. Erosion control measures shall be maintained as necessary to ensure their continued effectiveness until soils become stabilized.

   c. Petroleum products, chemicals, or other deleterious materials shall not be allowed to enter the water.

d. Waste materials shall be placed above the bankline and not in any wetland areas.

e. Removal of woody material shall be minimized.

f. All exposed soils shall be stabilized immediately after project's completion in order to prevent erosion and sedimentation.

4. The COE shall provide annual reports summarizing compliance with the special conditions of Wetland Removal/Fill Permit No. RF-13776 to NMFS after ground disturbance is initiated and for the first two years post-construction.

Landslide Impacts

5. The COE shall assess the risk and hazards associated with potential landslides along the margins of Joe Ney Reservoir relative to water surface level and drawdown rate. Based upon the recommendations of a professional geotechnical engineer, the COE shall cooperatively develop with NMFS a drawdown schedule that minimizes adverse effects to OC coho habitat.

ATTACHMENT 1

The Habitat Approach

Implementation of Section 7 of the Endangered Species Act for
Actions Affecting the Habitat of Pacific Anadromous Salmonids

Prepared by the National Marine Fisheries Service
Northwest Region
Habitat Conservation and Protected Resources Divisions
August 1999

I. PURPOSE

This document describes the analytic process and principles that the National Marine Fisheries Service (NMFS) Northwest Region (NWR) applies when conducting ESA § 7 consultations on actions affecting freshwater salmon[1] habitat.

II. BACKGROUND

Section 7 of the Endangered Species Act[2] (ESA) requires Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat.[3] Federal agencies must consult with National Marine Fisheries Service (NMFS) regarding the effects of their actions on certain listed species.[4] The NMFS evaluates the effects of proposed Federal actions on listed salmon by applying the standards of § 7(a)(2) of the ESA as interpreted through joint NMFS and U.S. Fish and Wildlife Service (FWS) regulations and policies.[5] When NMFS issues a biological opinion, it uses the best scientific and commercial data available to determine whether a proposed Federal action is likely to (1) jeopardize the continued existence of a listed species, or (2) destroy or adversely modify the designated critical habitat of a listed species.[6]

The Services' ESA implementing regulations define "jeopardize the continued existence of" to mean: "...to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild

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[1] For purposes of brevity and clarity, this document will use the word "salmon" to mean all those anadromous salmonid fishes occurring in, and native to, Pacific Ocean drainages of the United States – including anadromous forms of cutthroat and steelhead trouts, and not including salmonids occurring in Atlantic Ocean and Great Lakes drainages.

[2] 16 USC §§ 1531 *et seq*.

[3] 16 USC § 1536(a)(2) (1988).

[4] A 1974 Memorandum of Understanding between NMFS and FWS establishes that NMFS retains ESA jurisdiction over fish species that spend a majority of their lives in the marine environment, including salmon. *See* Memorandum of Understanding Between the U.S. Fish and Wildlife Service, United States Department of Interior, and the National Oceanic and Atmospheric Administration, United States Department of Commerce, Regarding Jurisdictional Responsibilities and Listing Procedures under the Endangered Species Act of 1973 (1974).

[5] *See* U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.* U.S. Government Printing Office, Washington, D.C. (1998).

[6] 16 USC § 1536(a)(2) (1988).

by reducing the reproduction, numbers, or distribution of that species."[7] Section 7(a)(2)'s requirement that Federal agencies avoid jeopardizing the continued existence of listed species is often referred to as the "jeopardy standard."[8] The ESA likewise requires that Federal agencies refrain from adversely modifying designated critical habitat.[9] The Services' ESA implementing regulations define the term "destruction or adverse modification" of critical habitat to mean:

> . . . a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.[10]

A species is listed as endangered if it is in danger of extinction throughout all or a significant portion of its range.[11] A species is listed as threatened if it is likely to become endangered within the foreseeable future.[12] Listing a species under the ESA therefore reflects a concern for a species' continued existence—the concern is immediate for endangered species and less immediate, but still real, for threatened species. The purpose of the ESA is to provide a means whereby the ecosystems upon which listed species depend may be conserved, such that the species no longer require the protections of the ESA and can be delisted.[13] This constitutes "recovery" under the ESA.[14] Recovery, then, represents a state in which there are no serious concerns for the survival of the species.[15]

Impeding a species' progress toward recovery exposes it to additional risk, and so reduces its likelihood of survival. Therefore, in order for an action to not "appreciably reduce" the likelihood of survival, it must not prevent or appreciably delay recovery. Salmon survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts

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[7] 50 CFR § 402.02 (1999).

[8] *See* M.J. Bean and M.J. Rowland, *The Evolution of National Wildlife Law. Third Edition.*Praeger Publishers, Westport, Connecticut, pp. 240, 253 & 260 (1997).

[9] 16 USC § 15536(a)(2) (1988).

[10] 50 CFR § 402.02 (1999).

[11] 16 USC § 1532(6) (1988).

[12] 16 USC § 1532(20) (1988).

[13] *See, e.g.,* 16 USC § 1532(3) (1988) (defining the term "conserve"); 16 USC § 1531 (b) (1988) (stating the purpose of the ESA).

[14] *See, e.g.,* 16 USC § 1533(f)(1) (1988) (describing the purpose of recovery plans).

[15] NMFS, *Memorandum from R.S. Waples, NMFS, to the Record* (1997).

of current practices.[16] Along these lines, the courts have recognized that no bright line exists in the ESA regarding the concepts of survival and recovery.[17] Likewise, available scientific information concerning habitat processes and salmon population viability indicates no practical differences exist between the degree of function essential for long-term survival and that necessary to achieve recovery.[18]

III. ORGANIZATION OF ENDANGERED SPECIES ACT § 7 ANALYSES

In conducting analyses of habitat-altering actions under § 7 of the ESA, NMFS uses the following steps: (1) Consider the status and biological requirements of the affected species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. If jeopardy or adverse modification is found, NMFS must identify reasonable and prudent alternatives to the action if they exist.

The analytical framework described above is consistent with the Services' joint ESA § 7 Consultation Handbook[19] and builds upon the Handbook framework to better reflect the scientific and practical realities of salmon conservation and management on the West Coast. Below we describe this analytical framework in detail.

A. Describe the Affected Species' Status and Define its Biological Requirements.

1. Identify the Affected Species and Describe its Status

The first step in conducting this analysis is to identify listed species, and when known, populations of listed species, that may be affected by the proposed action. Under the ESA, a taxonomic species may be defined as a "distinct population segment."[20] The NMFS has established a policy that describes such "distinct population segments" as Evolutionarily

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[16] Stouder et al., *Pacific Salmon and Their Ecosystems: Status and Future Options*, Chapman and Hall, New York, New York (1997).

[17] *Idaho Department of Fish and Game v. NMFS,* 850 F.Supp. 886 (D. OR 1994) (discussing NMFS' biological opinion concerning the Federal Columbia River Hydropower System).

[18] *See* 51 Fed. Reg. 19,926 (1982). In the preamble to the § 7 consultation regulations, the Services recognized that in some cases, no distinction between survival and recovery my exist, stating "If survival is jeopardized, recovery is also jeopardized...it is difficult to draw clear-cut distinctions" [between survival and recovery].

[19] *See* FWS and NMFS, *supra* note 5.

[20] 16 USC § 1532(16) (1988).

Significant Units (ESUs).[21] An ESU is a population or group of populations that is substantially reproductively isolated from other conspecific populations and represents an important component in the evolutionary legacy of the species.[22] In implementing the ESA, NMFS has established ESUs as the listing unit for salmon under its jurisdiction. Therefore, for purposes of jeopardy determinations, NMFS considers whether a proposed action will jeopardize the continued existence of the affected ESU or adversely modify its critical habitat.[23]

When affected species and populations have been identified, NMFS considers the relative status of the listed species, as well as the status of populations in the action area. This may include parameters of abundance, distribution, and trends in both. Various sources of information exist to define species and population status. The final rule listing the species or designating its critical habitat is a good example of this type of information. Species' status reviews and factors for decline reports may also provide relevant information for this section. When completed, recovery plans and associated reports will provide a basis for determining species status in the action area.

2. Define the Affected Species' Biological Requirements

The listed species' biological requirements may be described in a number of different ways. For example, they can be expressed in terms of population viability using such variables as a ratio of recruits to spawners, a survival rate for a given life stage (or set of life stages), a positive population trend, or a threshold population size. Biological requirements may also be described as the habitat conditions necessary to ensure the species' continued existence (*i.e.*, functional habitats) and these can be expressed in terms of physical, chemical, and biological parameters. The manner in which these requirements are described varies according to the nature of the action under consultation and its likely effects on the species.

However species' biological requirements are expressed—whether in terms of population variables or habitat components—it is important to remember that there is a strong causal link between the two: actions that affect habitat have the potential to affect population abundance, productivity, and diversity; these effects are particularly noticeable when populations are at low levels—as they are now in every listed ESU. The importance of this relationship is highlighted

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[21] *See* 56 Fed. Reg. 58,618 (1991).

[22] R.S. Waples, *Definition of "Species" Under the Endangered Species Act: Application to Pacific Salmon,* National Marine Fisheries Service (1991).

[23] NMFS has recognized that in many cases ESUs contain a significant amount of genetic and life history diversity. Such diversity is represented by independent salmon populations that may inhabit river basins or major sub-basins within ESUs. In light of the importance of protecting the biological diversity represented by these populations, NMFS considers the effects of proposed actions on identifiable, independent salmon populations in judging whether a proposed action is likely to jeopardize the ESU as a whole.

by the fact that freshwater habitat degradation is identified as a factor of decline in every salmon listing on the West Coast.[24]

Habitat-altering actions continue to affect salmon population viability, frequently in a negative manner.[25] However, it is often difficult to quantify the effects of a given habitat action in terms of its impact on biological requirements for individual salmon (whether in the action area or outside of it). Thus it follows that while it is often possible to draw an accurate picture of a species' rangewide status—and in fact doing so is a critical consideration in any jeopardy analysis—it is difficult to determine how that status may be affected by a given habitat-altering action. Given the current state of the science, usually the best that can be done is to determine the effects an action has on a given habitat component and, since there is a direct relationship between habitat condition and population viability, extrapolate to the impacts on the species as a whole. Thus, by examining the effects a given action has on the habitat portion of a species' biological requirements, NMFS has a gauge of how that action will affect the population variables that constitute the rest of a species' biological requirements and, ultimately, how the action will affect the species' current and future health.

Ideally, reliable scientific information on a species' biological requirements would exist at both the population and the ESU levels, and effects on habitat should be readily quantifiable in terms of population impacts. In the absence of such information, NMFS' analyses must rely on generally applicable scientific research that one may reasonably extrapolate to the action area and to the population(s) in question. Therefore, for actions that affect freshwater habitat, NMFS usually defines the biological requirements in terms of a concept called properly functioning condition (PFC). Properly functioning condition is the sustained presence of natural[26] habitat-forming processes in a watershed (*e.g.,* riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements. The indicators of PFC vary between different landscapes based on unique physiographic and geologic features. For example, aquatic habitats

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[24] *See, e.g.*, 57 Fed. Reg. 14,653 (April 22, 1992) (Snake River spring/summer and fall chinook); 62 Fed. Reg. 24,588 (May 6, 1997) (Southern Oregon/Northern California coho); 63 Fed. Reg. 13,347 (March 18, 1998) (Lower Columbia River and Central Valley steelhead).

[25] *See* NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[26] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon. The best available science does lead us to believe that the level of habitat function necessary for the long-term survival of salmon (PFC) is most reliably and efficiently recovered and maintained by simply eliminating anthropogenic impairments, and does not usually require artificial restoration. *See* Rhodes et. al., *A Coarse Screening Process for Potential Application in ESA Consultations.* Columbia River Inter-Tribal Fish Commission, Portland, Oregon, pp. 59-61, (1994); National Research Council, *Upstream: Salmon and Society in the Pacific Northwest. National Research Council*, National Academy Press, Washington, D.C., p. 201 (1996).

on timberlands in glacial mountain valleys are controlled by natural processes operating at different scales and rates than are habitats on low-elevation coastal rivers.

In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning." If a proposed action would be likely to impair[27] properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it will usually be found likely to jeopardize the continued existence of the species or adversely modify its critical habitat or both, depending upon the specific considerations of the analysis. Such considerations may include for example, the species' status, the condition of the environmental baseline, the particular reasons for listing the species, any new threats that have arisen since listing, and the quality of the available information.

Since lotic[28] habitats are inherently dynamic, PFC is defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival. Although the indicators used to assess functioning condition may entail instantaneous measurements, they are chosen, using the best available science, to detect the health of underlying processes, not static characteristics. "Best available science" advances through time; this advance allows PFC indicators to be refined, new threats to be assessed, and species status and trends to be better understood. The PFC concept includes a recognition that natural patterns of habitat disturbance will continue to occur. For example, floods, landslides, wind damage, and wildfires will result in spatial and temporal variability in habitat characteristics, as will anthropogenic perturbations.

B. Evaluate the Relevance of the Environmental Baseline in the Action Area to the Species' Current Status.

The environmental baseline represents the current basal set of conditions to which the effects of the proposed or continuing action would be added. It "includes the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early § 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process."[29]

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[27] In this document, to "impair" habitat means to reduce habitat condition to the extent that it does not fully support long-term salmon survival and therefore "impaired habitat" is that which does not perform that full support function. Note that "impair" and "impaired" are not intended to signify any and all reduction in habitat condition.

[28] Running water.

[29] *See* 50 CFR § 402.02 (1999) (definition of "effects of the action"). Action area is defined by the consultation regulations (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The environmental baseline does not include any future discretionary Federal activities (that have not yet undergone ESA consultation) in the action area. The species' current status is described in relation to the risks presented by the continuing effects of all previous actions and resource commitments that are not subject to further exercise of Federal discretion. For a new project, the environmental baseline consists of the conditions in the action area that exist before the proposed action begins. For an ongoing Federal action, those effects of the action resulting from past unalterable resource commitments are included in the baseline, and those effects that would be caused by the continuance of the proposed action are then analyzed for determination of effects.

The reason for determining the species' status under the environmental baseline (without the effects of the proposed or continuing action) is to better understand the relative significance of the effects of the action upon the species' likelihood of survival and chances for recovery. Thus if the species' status is poor and the baseline is degraded at the time of consultation, it is more likely that any additional adverse effects caused by the proposed or continuing action will be significant.

The implementing regulations specify that the environmental baseline of the area potentially affected by the proposed action should be used in making the jeopardy determination. Consequently, delineating the action area for the proposed or continuing action is one of the first steps in identifying the environmental baseline. For the lotic environs typical of salmon habitat-related consultations, a watershed or sub-basin geographic unit (and its downstream environs) is usually a logical action area designation. Most habitat effects are carried downstream readily, and many travel upstream as well (*e.g.*, channel downcutting). Moreover, watershed divides provide clear boundaries for analyzing the cumulative effects of multiple independent actions.[30]

C. Determine the Effects of the Action on the Species.

In this step of the analysis, NMFS examines the likely effects of the proposed action on the species and its habitat within the context of the its current status and existing environmental baseline. The analysis also includes an analysis of both direct and indirect effects of the action. "Indirect effects" are those that are caused by the action and are later in time but are still reasonably certain to occur. They include effects on species or critical habitat of future activities that are induced by the action subject to consultation and that occur after the action is completed. The analysis also takes into account direct and indirect effects of actions that are interrelated or interdependent with the proposed action. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration.

NMFS may use either or both of two independent techniques in assessing the impact of a proposed action. First, NMFS may consider the impact in terms of how many listed salmon will be killed or injured during a particular life stage and gauge the effects of that take's effects on

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[30] National Research Council, *Upstream: Salmon and Society in the Pacific Northwest. National Research Council*, National Academy Press, Washington, D.C., pp. 34, 213 & 359 (1996).

population size and viability. Alternatively, NMFS may consider the impact on the species' freshwater habitat requirements, such as water temperature, substrate composition, dissolved gas levels, structural elements, etc. This second technique is especially useful for habitat-related analyses because, while many cause and effect relationships between habitat quality and population viability are well known,[31] they do not lend themselves to meaningful quantification in terms of fish numbers. Consequently, while this second technique does not directly assess the effects of actions on population condition, it indirectly considers this issue by evaluating existing habitat conditions in light of habitat conditions known to be conducive to salmon conservation.

Though there is more than one valid analytical framework for determining effects, NMFS usually uses a matrix of pathways and indicators to determine whether proposed actions would further damage impaired habitat or retard the progress of impaired habitat toward properly functioning condition. For the purpose of guiding Federal action agencies in making effects determinations, NMFS has developed and distributed a document detailing this method.[32] This document is discussed in more detail below. The levels of effects, or effects determinations, are defined[33] as:

> **"No effect."** Literally no effect whatsoever. No probability of any effect. The action is determined to have "no effect" if there are no proposed or listed salmon and no proposed or designated critical habitat in the action area or downstream from it. This effects determination is the responsibility of the action agency to make and does not require NMFS review.
>
> **"May affect, not likely to adversely affect."** Insignificant, discountable, or beneficial effects. The effect level is determined to be "may affect, not likely to adversely affect" if the proposed action does not have the potential to hinder attainment of relevant properly functioning indicators and has a negligible (extremely low) probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. An insignificant effect relates to the size of the impact and should never reach the scale where take occurs.[34] A "discountable effect" is defined as being so extremely unlikely to occur that a reasonable person cannot detect, measure, or evaluate it. This level of effect

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[31] *See* Spence et al., *An Ecosystem Approach to Salmonid Conservation*, ManTech Environmental Research Services Corporation, Corvallis, Oregon (1996).

[32] *See* NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[33] These definitions are adapted from those found in NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996), and; U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.* U.S. Government Printing Office, Washington, D.C. (1998)

[34] "Take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct." 16 USC §1532(19) (1988).

requires informal consultation, which consists of NMFS concurrence with the action agency's determination.

"May affect, likely to adversely affect." Some portion or aspect of the action has a greater than insignificant probability of having a detrimental effect upon individual organisms or habitat. Such detrimental effect may be direct or indirect, short- or long-term. The action is "likely to adversely affect" if it has the potential to hinder attainment of relevant properly functioning indicators, or if there is more than a negligible probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. This determination would apply when the overall effect of an action has short-term adverse effects even if the overall long-term effect is beneficial. In such instances, NMFS conducts a jeopardy analysis.

The above effects determinations are applicable to individual fish, including fry and embryos. The MPI should be applied at spatial scales appropriate to the proposed action so that its habitat effects on individuals are fully taken into account. For example, if any of the indicators in the MPI are thought to be degraded by the proposed action to the extent that take of an individual fish results, the action is determined to be "may affect, likely to adversely affect." For actions that are likely to adversely affect, NMFS must conduct a jeopardy analysis and render a biological opinion resulting in one of the conclusions below:

"Not likely to jeopardize" and/or "Not likely to result in the destruction or adverse modification of critical habitat." The action does not appreciably reduce the likelihood of species survival and recovery or result in the destruction or adverse modification of its critical habitat.

"Likely to jeopardize" and/or "Likely to result in the destruction or adverse modification of critical habitat." The action appreciably reduces the likelihood of species survival and recovery or results in the destruction or adverse modification of its critical habitat.

D. Consider Cumulative Effects in the Action Area.

The ESA implementing regulations define "cumulative effects" as those effects caused by future projects and activities unrelated to the action under consideration (not including discretionary Federal actions) that are reasonably certain to occur within the action area.[35] Since all future discretionary Federal actions will at some point be subject to § 7 consultation, their effects will be considered at that time and are not included in cumulative effects analysis.

E. Jeopardy Determinations.

In this step of the analysis, NMFS determines whether (a) the species can be expected to survive, with an adequate potential for recovery, under the effects of the proposed or continuing action,

[35] 50 CFR § 402.02 (1999).

the environmental baseline and any cumulative effects; and (b) whether the action will appreciably diminish the value of critical habitat for both the survival and recovery of the species. In completing this step of the analysis, NMFS determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of critical habitat.

For the jeopardy determination, NMFS uses the consultation regulations and the MPI analysis method to determine whether actions would further degrade the environmental baseline or hinder attainment of PFC at a spatial scale relevant to the listed ESU. That is, because salmon ESUs typically consist of groups of populations that inhabit geographic areas ranging in size from less than ten to several thousand square miles (depending on the species), the analysis must applied at a spatial resolution wherein the actual effects of the action upon the species can be determined.

The analysis takes into account the species' status because determining the impact upon a species' status is the essence of the jeopardy determination. Depending upon the specific considerations of the analysis, actions that are found likely to impair currently properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat towards PFC at the population or ESU scale will generally be determined likely to jeopardize the continued existence of listed salmon, adversely modify their critical habitat, or both. Specific considerations include whether habitat condition was an important factor for decline in the listing decision, changes in population or habitat conditions since listing, and any new information that has become available.

If NMFS anticipates take of listed salmon incidental to the proposed action, the biological opinion is accompanied by an incidental take statement with reasonable and prudent measures to minimize the impact of such take, and non-discretionary terms and conditions for implementing those measures. Discretionary conservation recommendations may also accompany the biological opinion to assist action agencies further the purposes of habitat and species conservation specified in §§ 7(a)(1) and 7(a)(2).

F. <u>Identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the listed species</u>.

If the proposed or continuing action is likely to jeopardize the listed species or destroy or adversely modify critical habitat, NMFS must identify reasonable and prudent alternatives that comply with the requires of § 7(a)(2) and with the applicable regulations. The reasonable and prudent alternative must be consistent with the intended purpose of the action, consistent with the action agency's legal authority and jurisdiction, and technologically and economically feasible. At this stage of the consultation, NMFS will also indicate if it is unable to develop a reasonable and prudent alternative.

IV. APPLICATION TOOLS USEFUL IN CONDUCTING § 7 ANALYSES - THE MATRIX

As previously mentioned, NMFS has developed an analytic methodology to help determine the environmental effects a given action will have by describing an action's effects on PFC.[36] This document includes a *Matrix of Pathways and Indicators* (MPI; often called "The Matrix,") and a dichotomous key for making effects determinations based on the condition of the environmental baseline and the likely effects of a given project. The MPI helps the action agency and NMFS describe current freshwater habitat conditions, determine the factors limiting salmon production, and identify sensitive areas and any risks to PFC. This document only *helps* make effects determination, it does not describe jeopardy criteria per se.

The pathways for determining the effects of an action are represented as six conceptual groupings (*e.g.*, water quality, channel condition, and dynamics) of 18 habitat condition indicators (*e.g.*, temperature, width/depth ratio). Default indicator criteria[37] (mostly numeric, though some are narrative) are laid out for three levels of environmental baseline condition: properly functioning, at risk, and not properly functioning. The effects of the action upon each indicator is classified by whether it will restore, maintain, or degrade the indicator.

The MPI provides a consistent, but geographically adaptable, framework for effects determinations. The pathways and indicators, as well as the ranges of their associated criteria, are amenable to alteration through the process of watershed analysis. The MPI, and variations on it, are widely used in § 7 consultations. The MPI is also used in other venues to determine baseline conditions, identify properly functioning condition, and estimate the effects of individual management prescriptions. This assessment tool was developed for forestry activities. NMFS is working to adapt it for other types of land management, and for larger spatial and temporal scales.

For practical purposes, the MPI analysis must sometimes be applied to geographic areas smaller than a watershed or basin due to a proposed action's scope or geographic distribution. These circumstances necessarily reduce analytic accuracy because the processes essential to aquatic habitats extend continuously upslope and downslope, and may operate quite independently between drainages.[38] Such loss of analytic accuracy should typically be offset by more conservative management practices in order to achieve parity of risk with the watershed approach. Conversely, a watershed approach to habitat conservation provides greater analytic certainty, and hence more flexibility in management practices.

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[36] NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[37] The unmodified "matrix" uses ranges of values for indicators that are generally applicable between species and across the geographic distribution of salmon. The indicators can be, and have been, modified for more specific geographic and species applications.

[38] L. B. Leopold, *A View of the River*, Harvard University Press, Cambridge, Massachusetts, chapter 1 (1994).

V. CONCLUSION

The NMFS has followed regulations under §§ 7 and 10 of the ESA to develop an analytical procedure used to consistently assess whether any proposed action would jeopardize or conserve federally protected species. There is a legacy of a more than a century of profound human alterations to the Pacific coast drainages inhabited by salmon.[39] The analytical tool described as the MPI enables proposed actions to be assessed in light of the species current status, the current conditions, and expected effects of the action. Proposed actions that fail to conserve fish and their habitats as initially proposed can be redesigned to avoid jeopardy and begin to restore watershed processes. Conservation of listed salmon will depend largely on the recovery of watershed processes that furnish their aquatic habitat.

[39] *See* Cone and Ridlington, *The Northwest Salmon Crisis, a Documentary History*. Oregon State University Press, Corvallis, Oregon, pp. 12-21 & 154-160 (1996); W. Nehlsen *et al., Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington*, Fisheries, Vol.16(2), pp. 4-21 (1991).